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Dr. Arsène d'Arsonval

ARSENE d'ARSONVAL was born June 8, 1851, in La Borie, Haute-Vienne, France.

As a student, his interest was, primarily, in the study of physics, and especially in the practical application of this science to living beings and to medicine.

He went to Paris to pursue his studies and became the assistant of Claude Bernard, who was then director of the laboratory of biologic physics in the College of France, and later became professor.

In 1880, d'Arsonval came up for his doctorate, his thesis being, "Theoretic and Experimental Researches on the Role of Pulmonary Elasticity."

He was appointed a member of the congress of electricians and of the jury for awarding prizes at the International Electrical Exposition, in 1881.

The laboratory of physical biology of the College of France was established for d'Arsonval in 1882, and the same year he received the Monthyon prize for his remarkable researches in the heat equivalents of living organisms, for which he had to invent several new and ingenious pieces of apparatus.

That year was also made notable for him by the facts that he was appointed to give the course in experimental medicine

and was made a member of the Legion of Honor.

In 1894 he became a member of the Institute of France, in the section for medicine.

D'Arsonval's contributions to practical bio-physics have been very considerable. The invention of a number of pieces of delicate apparatus are to be placed to his credit, notably the galvanometer which bears his name and which, in a modified form, is now used in our electrocardiographs. He also devised a magneto-electric telephone and a new type of voltaic battery which opened a new field to chemists who were studying the production and economic uses of the thermopile.

He has published many learned papers since 1875, in the *Comptes Rendus de l'Academie des Sciences*, dealing with the physiology of heat and electricity, but his works have never been collected and little if anything has been translated into English.

D'Arsonval will probably be best and longest remembered for his work with high-frequency currents and their therapeutic applications. He was the first to construct practicable apparatus for producing these currents and to demonstrate that, when they were passed through living bodies, there was a point where neuromus-

cular reactions ceased and heat began to be produced in the tissues.

While the name applied in general to internal heat, generated by electricity (diathermy) was coined by Franz Nagelschmidt, d'Arsonval's name is still attached to one of the types of current produced by the modern high-frequency machines, and is thus known to every physical therapist in the United States, and we should never forget, in the rush of present-day developments, who it was that made much of our progress possible.

D'ARSONVAL—PERSONAL RECOLLECTIONS

With mathematical periodicity has the name of the French savant d'Arsonval come up before the student of scientific medicine. My earliest recollection of d'Arsonval was when I was a student of the abstract sciences. The time of year was the midsummer quarter. The sunshine on the outside and the droning voice of my famed teacher regretfully reminded me that I had "majored" in physics and that the outdoors was calling with an urge even superior to the fame of my teacher. The professor was at the time on the subject of the electromagnetic spectrum, and had already passed with due emphasis on the valuable contribution by Clerk-Maxwell, who, with only pencil and paper, gave to the dubious world the theory, which is still the marvel of present day physicists. The rest of the period was a startling exposition of modern scientific legerdemain, for the demonstration was on high-frequency currents, and the associated names of d'Arsonval and Hertz, two of its pioneers, were indelibly imprinted upon my memory. It was my first experience with Hertzian waves and d'Arsonval frequencies, and my imagination was fired with an inspiration, that is still undimmed to the present time, to explore farther into these mysteries.

I little realized at that time that I would have many occasions to meet with, and even cross the living path of one of these mythical personages. Up to that time I was indifferent to both the name of d'Arsonval and his accomplishments, and never gave thought to the possibility that he was not amongst the musty classicists of physics, who breathed living discomfort only to the student who strayed into the neighborhood of certain specialized pages.

The next period that I met with the name of d'Arsonval was in my sophomore medical days in the neuromuscular studies in physiology. I felt slightly better acquainted with the savant at this period, and his name rolled off my tongue with the familiarity of previous acquaintanceship. It will be recollected that d'Arsonval contributed certain definite studies in neuromuscular physiology with the sinusoidal current—a current whose authorship is attributed to the researches of this French student.

Parenthetically it might be stated that the credit of the foregoing contribution should be shared by the independent researches of Kellogg, of America, who, in the late 80's, called attention to its possibilities.

A further contribution that not only the student in physiology but also the student in electro-physics becomes familiar with, is the d'Arsonval galvanometer. This apparatus has found fields of universal usefulness, as it is the instrument *par excellence* to record data of the most precisionistic and delicate nature. Commerce has taken greater advantages and has exploited its possibilities more effectively than has medicine. While most of us remember this delicate apparatus as a mysterious instrument that more often than not added "tone" to the inner sanctum of the laboratory, it has, at the present time, come back into the medical world with an added luster and a different name, for, from this instrument it is but another step to the one that Einthoven perfected, which is recognized by the name of the electrocardiograph. With the latter delicate mechanism, as everyone knows, one is able to chart the elaborated electrical currents, not only of the heart muscle, but also of many other organs in the living body.

The name of diathermy or medical high-frequency currents is synonymous with the name of d'Arsonval. In spite of the fact that diathermy is an energy that saw its birth amidst the walls of such an orthodox institution as the College de France, it has received belated recognition by the medical profession. Even today it is the exception rather than the rule to see it receive unbiased endorsement by any majority in a University faculty. This appears to be one of the paradoxes in scientific medicine and would lead to fascinating speculation if space permitted.

My last trip to some of the physical therapy centers in Europe was so planned that it would permit me to participate in the discussions of the First Congress of Radiology at London (1924), and also, afterwards to swing through France, Belgium, Switzerland, Austria and Germany. Visits to definite physical therapy centers in each country were planned in advance and successfully consummated.

During the congress, every notable in the various representative specialties within the larger specialty, physical therapy, was present. From this representative and distinguished body, however, the name of d'Arsonval was missing. Rumor had it that this venerable savant, the man that I knew in an idealized form from my student days; the man that impressed himself upon me in my medical formative period; the man that I later knew through correspondence, had passed away.

Somewhere, a doubt as to his demise was awakened within me, for everyone that I had questioned was entirely too vague for comfort or certainty. It had been my ambition, for many years, both actively and tacitly, to visit this illustrious but vague personality. My decision was not deterred because of these rumors and, in spite of them, I determined to either find the living d'Arsonval or to place a wreath upon his shrine.

I smile now as I look back at this adventure, the beginning of which looked as hopeless and fantastic as anything that ever came out of the mind of a Cervantes—an adventure that started inauspiciously with the most superficial acquaintance with France and its people, and seeking, supposedly, a man that had, to all reports, already entered into the beyond. That certainly was a fantastic beginning to a realistic end, for Fortune was my kindly companion and I found the living d'Arsonval. My emotions could hardly be translated at the time when I received the cordial invitation from d'Arsonval to visit him at the College de France, which is located in a virgin-like forest, just outside of Paris.

In the absence of any picture of the savant or an acquaintance with his personality or age, I knew little how to prepare for my anticipated visit, and less what to say to him on introduction. A typical French motor sped me to my destination, but my thoughts and emotions

flew helter-skelter and preceded and lagged behind my flying conveyance.

Upon reaching the outskirts of Paris, I made my sudden decision to dismiss my cab and walk the rest of the distance. The woods were promising of peace, as there was an air of restful quietness at its entrance. As I entered the park-like, virginal forest, dark and peaceful, with distant singing of unknown birds in my ears, my emotions became more restful and my mind collected. My nose was assailed by the musty fragrance of freshly cut grass that intermingled with the undefined perfumes from neighboring flowers. The drippings from the overhanging branches spoke of rain that had passed. The summation of the picture spoke of romance, unexplored adventure and mystery.

At a tall, barred, iron gate I rang the bell and the doorkeeper led me up several flights of stairs and past many doors into the presence of a benign and venerable man, d'Arsonval. I was made to feel at ease in the shortest period describable and, in less time than it takes to tell it, d'Arsonval became acquainted with my mission and pilgrimage and chuckled kindly when I informed him of my difficulty in reaching him.

My first impression of him can be described in three words: gracious, benignant and tolerant. In spite of his age, time has treated d'Arsonval as though he was a favorite son. Intellectually he was keen, as his rapier-like retorts and questions indicated. Apparently the cloistered habits of the man had kept him out of touch with the changing world, and he was an interested listener to my account of the progress of medical diathermy in America. At the end of my story I noticed a twinkle in his eyes, and heard him chuckle. "The medical world," commented he, oracularly, "like the classical gods, grinds slowly but grinds exceedingly fine. It has taken the medical profession thirty-seven years to show an appreciation of the possibilities of medical high-frequency currents. I am satisfied to have posterity reap the benefit of the work that I had dedicated to the present and the living. I have immortalized an idea, just as some in the past have bequeathed an ideal. Most of us are merely the mouthpieces of our times, as we receive our intellectual sustenance from the roots of past ideals. It is well."

I spent an inspiring two weeks with the master and greatly benefited by his untiring efforts. He retraced all of his past researches, to the time when he was experimenting with alternating currents, and showed me at what point in the crossroad of his experiments he arrived at the conclusion that, at a definite frequency, all neuromuscular responses ceased and heat was produced.

D'Arsonval and his coworkers have done considerable research in diathermy and its effect on viable structures, and it is to be regretted that it has not seen the light of translation. I carried back with me happy and satisfied memories of the scientist and the humanist, d'Arsonval.

DISRAELI KOBAK.

No man is greater than the persons, things and events that occupy his mind. It is the sum-total of these things that measures his life. How important, then, it is that we should never allow petty things to absorb our attention; or little men to disturb our serenity; or trivial activities to consume our time.—Laurie J. Quinby.

THE PHYSICAL THERAPY NUMBER

Physical therapy is occupying so much attention in the medical world, and the results obtained by physical methods of treatment are, in many cases, so striking, that we have felt that we owe it to our readers to keep them informed of what is going on in this field. This we have endeavored to do by publishing articles on various phases of the subject almost every month.

That, however, did not seem wholly sufficient. You are entitled to hear, from the recognized leaders in this line of work, what they are doing and how they are doing it.

We enlisted the cooperation of Dr. Disraeli Kobak, Professor of Physical Therapy at Rush Medical College (Univ. of Chicago) and president of the American College of Physical Therapy. With his able assistance we here offer you what we believe to be the most complete and authoritative review of the subject of physical therapy which has yet appeared in any medical journal.

Other special numbers are now contemplated or actually under way, about which we will tell you when the plans are more mature. One thing we can now promise is a symposium on intravenous medication which will probably appear in the October number and a series of articles on Medical

Malpractice, by an authority on that subject. These will be worth watching for.

While we are offering you here the opinions of the authorities, we have no idea that they hold a monopoly on knowledge of physical therapy methods and results. Many men whose names are not now widely known are doing good work along this line. If you are accomplishing things by the use of physical agencies, tell your professional brethren about it, through these pages.

If you are especially interested in this work it will pay you to attend the sessions of the American College of Physical Therapy, in Chicago, this autumn (announcement on another page). We shall hope to see you there.

It is the studying that you do after your school days that really counts. Otherwise you know only that which everyone else knows.—Henry L. Doherty.

FACTS AND FANCIES IN PHYSICAL THERAPY

Ultraviolet Therapy

The medical profession is, at the present time, focusing more critical attention upon therapy by physical measures than at any other recorded period. This no doubt is due to a multiplicity of causative factors, such as the mechanistic spirit of our times and the psychology of universal electrification in the world of commerce.

Several specific outstanding factors have had an important influence in bringing this heretofore questionable specialty to the forefront of medical practice. One factor of importance was the frequency with which injured fighting units or individual combatants in the World War were restored to a higher state of health following physical therapy intervention. Another factor was the restoration to health of injured soldiers, in all armies, during the reconstruction period, by the same method. This was one of the outstanding contributions of the War, and it awakened a renewal of interest in the medical professions to the neglected possibilities that may be inherent in radiant energies or in thermo-hydro-electro-mechanical therapy.

The impulse to clinical investigation and laboratory research was further stimulated by simultaneous publications in various foreign countries on the value of natural sun bathing. Switzerland contributed at least three outstanding clinicians who recently published their experience that had its beginning at least two and one half

decades ago. The medical profession is familiar, to a varying degree, with the contributions of Rollier, Bernhardt and Davos, although few of us realize that their magnificent contributions, paradoxically, were the result of either personal or familial tuberculous diathesis.

Laboratory research from many of the most important centers of learning has more recently offered contributory evidence of the value of ultraviolet rays and the healing power of solar radiation. As in the commercial world, so also in the medical world, we are, at the present time, not only harnessing nature's forces but making of them inanimate slaves for the benefit of mankind. Climatic and seasonal changes need no longer deter one from the benefits of the sun's radiant forces, for this untiring servant, our artificial sun lamp; i.e. mercury-quartz or carbon arcs, will supply a regulated and measurable quantity of the sun's energy at a convenient bedside or in the physician's office. Its oxidizing and tonic properties are indisputable, while the ability to influence the blood chemistry by increasing the calcium and phosphorus of the blood is a fact that has been established by many independent research workers.

The bactericidal properties which have been recorded by modern investigators, namely Downes and Blunt, are of value more as an academic discovery than as a therapeutic agent. Since the penetrating properties of ultraviolet are extremely slight, its effect, although definitely lethal to microorganisms, is extremely superficial and hence is of questionable utility as a bactericidal agent when in competition with the well-established chemical bactericides on the market. In the light of recent investigations by Carl Sonne, of the Finsen Institute, one must also accept with some reservations its hemobactericidal properties.

Because of the antagonistic effect of the near and the far ultraviolet region in the spectrum, much confusion in application and in results is still in evidence. Ultraviolet can be either biotic or abiotic; tonic or depressant; oxidizing or bactericidal, depending upon the utilization of either the near or the far range in the ultraviolet spectrum. The misunderstanding of the few foregoing principles has led to disappointment, while the misunderstanding in application has led to a premature con-

demnation by many able and well informed men in our profession. In spite of the wide range of application to many diseases and its specificity in a certain few, ultraviolet therapy is not a panacea. It should be utilized merely as a flexible adjuvant.

The Cast of Medical Diathermy Therapy

Out of the researches of d'Arsonval and Tesla has arisen a fascinating romance built around the coined word, diathermy. This robust but more or less inexplicable child of modern medicine was sponsored in its prenatal stages by many notable personages. Joseph Henry, an eminent American physician, who, in 1842, described the oscillatory character of the discharges from a Leyden jar, is one of a group of unrecognized workers upon whose memory we place a laurel wreath. Four other physicians, separated by distinct national boundaries; namely, Feddersen of Denmark, Hertz of Germany, Tesla of America and Lodge of England, contributed some fundamental research to the final birth of medical high-frequency currents.

D'Arsonval, the discoverer of diathermy, which was christened by that name nearly two decades after its discovery, little realized the potentialities of this new energy. In his original contribution on this subject, d'Arsonval merely made claim that by passing a three-ampere current through the body it had the effect of heating tissues. Contemporary scientists later on became cognizant of the fact that this thermal quality was deeply penetrating, and Von Zerneke and Von Preiss called it "Thermopenetration"—a name that, possibly, in the light of more recent critical investigation, is more fitting than the questionable coined word "Diathermy."

Two indisputable facts with reference to the effects of diathermy are its production of heat deep in the tissues—deeper than by any other known method—and a production of an active hyperemia. The after-effects of an active hyperemia are too well known to need repetition. The obtunding of neuromuscular responses by a medical high frequency current not only has enabled the introduction of the so-called diathermic current into viable tissues, but has also been the source of much error and confusion amongst its medical interpreters and local manufacturers.

Studies in the electro-physiology of high frequency currents has taught modern investigators that its wide range of fre-

quency or oscillations have varying penetrating effects. As the frequency increases the penetration inversely decreases, while the voltage, the theoretical *vis-a-tergo* in medical electricity, plays a far less important role than is at present recognized. Since all of the known laws and physiologic effects of diathermy were recognized and collected into printed form long before it became disputable by word with the American profession, it is of interest to call attention to the fact that the European diathermic instruments are operated on a low voltage scale, high amperage, low frequency and with a relatively undampened current. Further, that there is a distinct differential quality between a d'Arsonval current (which is distinctly antagonistic in effect and opposite to the above enumerated points) and that of the diathermic current.

Much good can be accomplished with diathermy when the physician brings to the patient a thorough orientation in his profession and a knowledge of the limitation of this agency. One cannot accomplish the impossible, and dead tissue cannot be reawakened to life, nor can lost function be completely restored. Diathermy has recognized medical virtues but it has also limitations. It can be predicted that its possibilities will be greatly extended in the near future when the factors of frequency and voltage will be properly evaluated. There is need of intensive investigation, both in clinical corroboration of the laboratory findings and in the physical laboratory, to determine more complete standardization of the instrument.

DISRAELI KOBAK.

What you don't know, somebody else is getting paid for knowing.

PERSONALIZING THE MONROE DOCTRINE

We all talk about the Monroe Doctrine in an off-hand manner, and some of us really know what it is all about, or think we do. It is generally conceived as merely a warning to the nations of Europe to keep their fingers out of the tempting pie of Latin America.

Perhaps the President who promulgated this Doctrine meant only that: Perhaps he

was more of a prophet than we have credited him with being. It looks now as though "America for Americans" might well become the rallying-cry for the sane, thoughtful and unselfish citizens of the United States, as applied to our own particular section of the Western Hemisphere.

Our former policy of the open door to all the races of Europe brought into our Country millions of foreigners who had no sympathy whatever with our purposes and ideals and no intention of casting in their lot with us, for better or for worse. These groups of aliens are strongly intrenched in our larger cities; speaking and reading nothing but their native tongues; thinking always in terms of Europe; and not infrequently busily engaged in activities directly subversive of our institutions.

We read with horror of the depth and magnitude of the plots revealed by the recent investigation of Bolshevik activities in England. Are we so sure that equally daring and disastrous plans are not being fomented almost under our noses?

Several years ago we adopted an immigration policy intended to stem the tide of undesirable and unassimilable foreigners which was pouring into the country, and that policy has amply justified its being. But it is not impregnable. Highly organized groups of aliens, supported by venal politicians and self-interested industrialists, are working day and night to undermine the levees and precipitate upon us a human flood which will work more ultimate disaster to our Land than have the recent outpourings of the Mississippi.

If we go to sleep on the job, as we have a way of doing, these people will be successful in their plans. We must organize and work as actively as they if we are to save our institutions intact.

Let us, individually and collectively, make known our opinions and wishes to our representatives in Congress, in no uncertain terms, returning to the old, sometimes overworked, but now intensely meaningful slogan, "America for Americans."

Increases in population tend to produce a marked increase in sickness and death, and such increases will surely occur unless the people themselves will cooperate with their health authorities.—Surgeon General, U.S.P.H.S.

By no political alchemy is it possible to make a golden society out of leaden individuals.—Bahá'u'lláh.

Great Physician Passes

ON August seventh, 1927, the Nation sustained a loss, the gravity of which comparatively few persons are sufficiently informed to appreciate, because one of the greatest Americans of this generation proceeded about the various tremendous duties which were assigned to him with that quiet effectiveness which characterizes the operations of the most powerful and perfectly-constructed machines.

Smaller and less well-balanced men may make such a noise in the world that all eyes are turned upon them, but Leonard Wood accomplished some of the most momentous tasks which have fallen to the lot of an American within the past century, and did it with a modesty and self-effacing thoroughness which brought him the reverent admiration and the love of those who were in a position to appreciate the size of the man and his achievements, but left the thoughtless rabble cold, because they were incapable of sensing the proportions of so heroic a figure.

Of sound and unbroken Anglo-Saxon stock and of American ancestry and antecedents since the very beginnings of this Country, Leonard Wood was born at Winchester, New Hampshire, October 9, 1860, the son of a country doctor of the old school.

He was a shy, quiet lad but he loved the woods and the sea and was a leader in feats of strength and hardihood. As a boy he wished to enter the navy, but family traditions were too strong and he matriculated at Harvard Medical School in 1880, receiving his degree in 1884.

For two years Dr. Wood practiced in one of the poorer districts of Boston, where

work was plenty but money very scarce. Then the call of the Service sounded so loudly that he took the examination for appointment as an Army surgeon and passed second in a class of 59.

There was no vacancy in the Medical Corps at that time, so Wood asked to be appointed a contract surgeon and sent west to take part in the campaign against the Apache Indians. During this campaign

he demonstrated his military ability and displayed a physical energy and endurance which amazed even the Indian scouts.

For ten years his life and duties were those of the ordinary Army surgeon varied by all the strenuous athletic sports and hard outdoor jobs which he could find to do.

When war was declared against Spain, Wood was in Washington as the personal physician of President McKinley. There he had met a thoroughly congenial friend and comrade, in the person of the Assistant Secretary of the Navy, Mr. Theodore Roosevelt.

When the command of the regiment of "Rough Riders" was offered to Roosevelt,

he told the President that, by reason of his military and western experience, Dr. Wood was better fitted for such a command and should be made the colonel, he (Roosevelt) being appointed lieutenant-colonel. This was done.

Wood distinguished himself in Cuba and was made a Brigadier, whereupon Roosevelt assumed command of the "Rough Riders," with the rank of Colonel. After the capture of Santiago, Wood was placed in command of that district, where his services were of so outstanding a character that, at the end of a year, he was made



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Leonard Wood, M.D.,
Major General, U. S. Army,
Governor General of the Philippine Islands.

Military Governor of Cuba, with the rank of major-general of volunteers.

In three years, General Wood transformed Cuba from a poverty-stricken and semi-barbarous land into a country of health and plenty, his medical training standing him in good stead. The death rate in Havana fell from 91 per 1000, in 1898, to 20 per 1000, in 1902. In the 30 years preceding his appointment there were, in Havana, 21,448 deaths from yellow fever and 12,722 from smallpox. In the 10 years after that date there were 44 deaths from yellow fever and 4 from smallpox.

The following years he spent in the duties which fall to a general officer of the Regular Army, but unlike some others, he never permitted himself to be paralyzed by bureaucratic red tape. Among his other duties during that time he was, for a considerable period, Governor of the Moro Province in the Philippines, and his relations with these semi-barbarous Mahometans were such that, upon hearing of his death, the Sultan exclaimed, "We have lost our father."

In 1910 he was made Chief of Staff of the Army. It is interesting to note that, while General Wood was at the head of the Staff, another physician, Major General Ainsworth, was the senior Line officer of the United States Army.

One of his most outstanding achievements as Chief of Staff was the inauguration of the "Plattsburg Movement." Wood, with that vision which characterized his whole career, had seen the crying need for military preparedness and, in 1913, he initiated the first summer training camps for young business men, students from which were so invaluable at the time of the World War.

Personal motives in high places kept Wood from taking the place in the Great Conflict to which he was justly entitled, but, like the good soldier he was, he never murmured. In Europe, as an observer, he was recognized as the outstanding military mind of this Country, and, later, our citizens did themselves a grave injustice when they failed to avail themselves of the opportunity to make him President of the United States.

Soon after this mistake on the part of his countrymen, General Wood was assigned to the most difficult and thankless under-

taking in the public service—that of Governor General of the Philippines.

People in this country are so densely ignorant of Philippine conditions that there is no basis for the formation of an enlightened public opinion in the matter; ninety percent or more of the Filipinos have no more conception of the intricacies of the situation than has a child of five years; the Tegalogs "*politicos*," in and around Manila, claim—wholly without basis—to speak for the mass of their countrymen, but their chief concern is their own advancement and prestige.

Such were the conditions under which General Wood took up his arduous task. Those of us who are in a position to know have watched with wondering admiration the steadfast and masterly manner in which this great man discharged an onerous but essential duty, in the face of divided counsels at home and a physical malady which was slowly sapping his splendid strength.

And now History has claimed him! The powerful body which he wore will rest in the "Rough Riders' Plot," in Arlington Cemetery, among those of the Nation's other heroes, and there his countrymen will do him tardy honor. Even his bitterest political opponents paused to pay tribute to his unflinching sincerity of purpose and to the indefatigability of his labors.

But in honoring him we will do even more honor to ourselves. Those who cannot take a leading place in the march of events can touch the fringes of greatness in recognizing a great man when he appears. That much we can do.

So long as America can produce such sons as Leonard Wood we need have no fear that she is decadent. While the medical profession numbers such men in its ranks it needs no apologists.

And as we grieve over this irreparable loss, to the United States and to Medicine, let us rededicate ourselves to the ideals for which he stood, prominent among which was a vision of a Country adequately prepared for any military emergency, and resolve to follow his example of selfless devotion to the Nation's welfare; unwavering performance of any duty, however unpleasant; thorough preparation for any work he had to do; and unwearying industry in the doing of it.

Leading Articles

Sinusoidal Therapy

By JOSEPH E. G. WADDINGTON, M.D., C.M., Detroit, Mich.,
President, Western Association of Physical Therapy.

LET us first clearly define "sinusoidal;" next briefly recall some of the most pertinent and scientific thought and facts relating to biophysics and biochemistry; then there can be no mental haziness as to the logical character of the therapy advised.

A sine curve is the path traced by the ever-changing value of the sine of a constantly changing angle; the sine being the ratio of the perpendicular or ordinate divided by the hypotenuse; the value or contour of the curve being therefore determined at any instant by the sine or perpendicular of the angle at that particular instant. It will accordingly be noticed that a sinusoidal curve is entirely different from that of a circle or any circumferential portion of it.

A sinusoidal current then—unlike the faradic or even the ordinary alternating current—is one which commences at zero potential; gradually ascends to maximum; thence as gradually descends to zero again and then reversingly repeats the process. With the direct current, this sinusoidal curve is alternately positive and negative in polarity; and by some purists it is contended that only such a modification of the galvanic or direct current can thus be accurately designated as sinusoidal.

However, it is not the geometric proportions of the current itself but the curve of gradually increasing and decreasing maximum potential or peak of effective voltage or contractility that is the distinctive feature of the sinusoidal current; it is thus quite as accurately applicable to a similarly modified alternating current whose maximum potential similarly ascends and descends but not with any perceptible polarity reversal.

The direct current form of sinusoidal has an appreciable polarity phase with an adjustable duration range of anywhere from possibly 3 seconds to $\frac{1}{4}$ of a second. As each phase is alternated by a precisely equal one of antithetical polarity, consequently no *specific* polar or chemical action or reaction can take place; however, due to this definite duration of positive and negative: sedative and stimulant—though fleeting and alternate—a decidedly trophic,

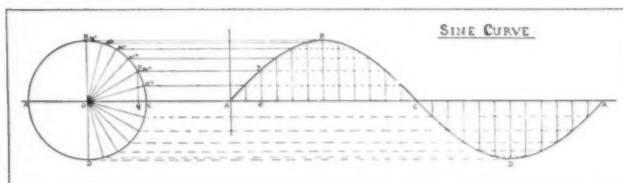


Fig. 1.—The Sine Curve.

metabolic, or non-specific chemical reaction is biologically in evidence, additional to its marked mechanical or contractile effect.

The alternating current form of sinusoidal, being derived—in the newer type

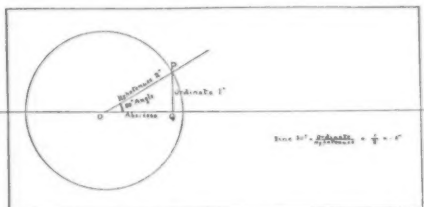


Fig. 2.—The Sine Angle.

machines—from at least a 180-cycle per second current, has a polarity phase of such infinitesimal duration as to be chemically non-existent and is thereby more simply evidenced by mechanical or contractile response.

A third distinctive modification—which applies equally to both forms of the current—is the dwell or sustained wave. As the name implies, the maximum potential or peak of contraction is held or sustained for a certain appreciable and definite dura-



Fig. 3



Fig. 4.

Fig. 3.—Diagram of galvanic or direct current form sinusoidal, depicting $1\frac{1}{2}$ cycles or revolutions of 3 polarity reversals.

Fig. 4.—Diagram of alternating form sinusoidal, depicting 3 cycles of numerous polarity reversals.

tion of impulse, being then followed, in some modifications, by a briefer spaced duration of non-perceptible current; and in others, by an equally spaced duration of rest. It is consequently more energetic in contractile effects, somewhat resembling the contrasted difference between the short sudden snap of a terrier and the sustained grip of a bull dog.

There are various refinements of these three distinctive types of the sinusoidal currents; but considering their peculiarly differentiated characteristics and their flexibility, delicacy, and innumerable phrasing of phase duration, it will be unnecessary to extend our therapeutic indications beyond this quite comprehensive and characteristic trio.

Sinusoidal Currents and Body Chemistry

Howell believes¹ that the metabolism of material in the body by means of which its heat energy is produced is, at bottom, comparable to ordinary combustion; that the intensity of the oxidation process is conditioned by the tissue itself and that the metabolic processes are essentially chemical in action.

As chemists and biochemists are increasingly appreciating that chemical action is intrinsically electrical, there should be no cause for surprise or argument when one states that sinusoidal currents are not only valuable for their mechanical ability to contract and relax tissues rhythmically but are also infinitely more valuable on account of the oxidation or metabolic processes thereby inseparably correlated. This perhaps emphasizes the possibly superiorly indicated galvanic or direct form of sinusoidal current, where combined trophic and mechanical response is especially indicated; the alternating form of sinusoidal may be more particularly thought of when the contractile

response itself is the chief desideratum, and for conditions where the more sensory galvanic sinusoidal would therefore be incapable of being used in strength sufficient to elicit adequate contractile response.

Mathews,² in discussing the "fundamental chemical processes which are at the bottom of all life of every kind," says, "The atoms consist of a number of electric charges—positive and negative; every oxidation is an electric current and every electric current an oxidation and reduction; life and electricity are indissolubly associated and every transfer of energy, and energy itself, is but so much electric current and magnetic flux."

Chemistry fundamentally divides into two distinctive states or structural types: crystalloid and colloid (non-crystalline). "It seems as though all that nourishes life structure as foods, as well as the normal life structures thus served, are colloidal in



Fig. 5

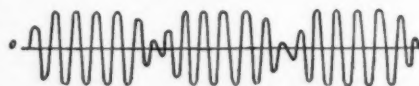


Fig. 6

Fig. 5.—Diagram of direct form of sustained wave.

Fig. 6.—Diagram of alternating form of sustained wave.

their nature. The stepping onward of normal biological processes, the transferring of vitality from colloidal cell to colloidal cell or from colloidal created organisms to organisms concerned in the support of life, seems ever to lean upon the movements and action of colloidal bodies which, in their formation and transformation produce derivatives that, if normal, are colloidal."

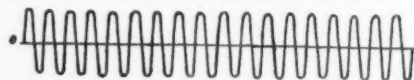


Fig. 7.

Fig. 7.—Diagram of rapid form sinusoidal.

Considering the intricate chemistry of the cells composing the human tissues and the exquisite sensitiveness and complexity of cytologic activity, is it any wonder that sinusoidal currents—by their power not

only to actively energize tissues en masse but the integrant cells themselves—should be capable of initiating desired metabolic changes, not only of local but also of far-reaching constitutional importance?

Fifteen years ago Kellogg⁴ emphasized the metabolic properties of the sinusoidal current, referring particularly to its sugar-reducing properties in diabetes mellitus; and in a recent personal communication he reaffirms his faith in such therapy, in addition to the orthodox administration of insulin.

Practical Application

As function means growth, non-functioning muscles will necessarily atrophy unless stimulated into action. Paralysis of peripheral origin can not be cured or even ameliorated by a sinusoidal current, but its employment will cause paralyzed muscles to respond, despite nerve impairment and non-volitional response of the patient, and thus prevent or at least decrease expected atrophy. Muscular tissues whose innervation has been destroyed or seriously impaired will not respond to a rapidly interrupted current; it is therefore imperative to employ the galvanic form of sinusoidal in such cases; but, upon evidence of nerve regeneration, the alternating form is then superiorly indicated.

To impress the deeper structures of the body it were better to employ the alternating form of sinusoidal directly over the spinal innervation of the part. For constipation, one can treat directly through the spinal centers (7th and 8th dorsals, or over the 1st, 2nd and 3rd lumbers) or indirectly over the abdomen. When treating the degenerated muscles of a limb, a superior response may be expected by placing the electrodes at the origin and the insertion, respectively, of the muscle.

Considering the functional arrest so prevalent, sequent to all surgical and obstetrical procedures of any moment; the prolonged convalescence from serious acute diseases; and the functional inactivity of chronic impairment of health, it should need no interminable list of diseases and symptoms to emphasize and particularize the indications for sinusoidal therapy.

Wherever functional inactivity of the musculature may exist and can be reached, either directly through its innervation or directly and indirectly through the musculature itself, the sinusoidal currents will be

valuably indicated. Delicate structures and sensitive conditions will demand mild currents and short seances; more robust and chronic, insensitive conditions will indicate more prolonged sessions and the stronger pull of the sustained or dwell-wave currents. Dependent upon the fragility of the nerve structures and muscle tissues involved, initial treatments should be of only a minute or two or, occasionally, even less; and should rarely exceed a maximum of ten minutes, as this apparently seems to be the acme of healthful stimulation.

For strictly cellular massage or trophic inspiration, about one hundred impulses or contractions per minute allow sufficient alternate duration of contraction and relaxation; for contractile stimulation of muscles, the normal physiologic movement should be simulated as much as possible—for the arms 30 to 40 movements per minute; the legs about the same; intestinal canal 10 to 12; respiratory muscles 18 to 20.

For general treatment, as for diabetes and obesity, the sinusoidal bath, immersing all but the head and using two metal plates at opposite ends of the bath tub for electrodes, is the most convenient and advantageous method of administration.

Sinusoidal therapy is tonically indicated in the treatment of the various ptoses: gastropptosis; enteroptosis; ptosed kidney or uterus; flabby, pendulant abdominal muscles; and though such therapy can not restore original muscular resilience to severely degenerated musculature, yet, in not too severe and prolonged tissue debility, appreciable relief may confidently be expected. Charles P. Hutchins, of the Aetna Life Rehabilitation Clinic states:⁵ "I have always thought of the slow (galvanic form) sine-wave in its adaptability for preserving the integrity of muscles during the interval before the anatomical restoration of nerve trunk or bone, permitting its function of the neuro-muscular combination; the slow, effort-like contractions, with gradual undulations, of the slow sine-wave are perfect imitations of the voluntary contractions that best develop muscle in size and strength."

The dwell-wave currents are especially indicated in the treatment of pelvic adhesions, when not too acutely sensitive or after initial preparatory treatment with the milder non-sustained current. Adhesions cannot be expected thus to absolutely resolve themselves but, when not too firmly

and chronically organized, and especially in the early post-operative period, daily applications should at least be logically preventative of more extensive pathologic changes and assist in limiting contractures. Sinusoidal currents are physiologically valuable after all abdominal sections—as soon as the wound is sufficiently healed—to substitute a healthful hyperemia for a pathologic stasis, and thus minimize, at least, the functional inefficiency naturally sequent to operative traumatism with its ensuing enforced functional inactivity.

Myalgias, acute and chronic—of which lumbago is the especially common and usually intractable archetype—are quite amenable to sinusoidal therapy, applied in such dosage as the sensitive exigency of each particular case may warrant.

A rapid form sinusoidal—the 180-cycle current not divided into distinctive phases or contractile pulsations—is quite a pain reliever in super-sensitive muscular trau-

matisms, such as sprained ankle, but should be used only for a few minutes preparatory to the then preferably indicated interrupted sinusoidal, when the pain is sufficiently relieved to permit of such application.

Conclusions

Metabolism is integral to biology; biologic processes are chemical in nature and consequently recognized as initially and essentially electrical.

Sinusoidal currents are powerfully metabolic in character and specifically distinguished by their power to cause non-volitional, smooth and rhythmical contraction and relaxation of muscular tissues.

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110 Atkinson Avenue.

Hemorrhoidectomy by Means of the High Frequency Current

By WILLIAM BIERMAN, M.D., New York City

UNTIL recently the medical profession has displayed little interest in the subject of hemorrhoid removal by means other than the straight surgical procedures usually employed—clamp and cautery and excision and ligation methods. These are the only methods which the profession had to offer to the individual who applied for relief from this distressing rectal condition. He could take it or leave it. In many instances he elected to do neither and betook himself to the practitioner (perhaps an irregular one) who promised to relieve him in a less disagreeable fashion. These practitioners employed the methods of electrolysis, injection, electro-coagulation and electro-desiccation. Until now, the profession has been inclined to pooh pooh the merits of these procedures. It is being forced, however, to recognize their value by the large number of sufferers who have secured relief from their employment and by the successful results of the regular doctors who have been sufficiently venturesome to try these methods themselves.

I shall leave it to others to dilate upon the merits of the electrolytic and injection methods. This latter procedure appears to be a good one for the treatment of uncomplicated internal hemorrhoids. It is, however, not so flexible in its application to the various types of hemorrhoids and the frequently associated conditions, such as fissures, polypi and prolapse, as is the method of electro-coagulation and electro-desiccation. These measures have the additional advantage of resulting in complete removal of the hemorrhoid tissues. In this, they resemble ordinary surgery.

Preparation and Anesthesia

The operation itself may be performed under local anaesthesia, in the doctor's office. The patient is permitted to go home directly afterwards.

The preparation on the part of the patient consists in the thorough evacuation of the bowels, aided, if necessary, by an enema. If the operation is to be performed in the morning, it is suggested that the

patient partake only of some crackers and milk. If in the afternoon, the patient is asked to take some tea and toast for lunch.

The operation may be performed with the patient in the lithotomy position. It is not necessary to use an insulated table. After the region about the anus is washed with soap and water and painted with some antiseptic, the local anaesthetic is injected perianally. The peri-anal method of anaesthesia is preferable for two reasons: It allows dilatation of the sphincter, permitting ready access to internal hemorrhoids; and it does not distort the shape and size of the hemorrhoidal mass as does the local injection into the hemorrhoid itself.

For the destruction of the hemorrhoidal tissue, I employ both the bipolar d'Arsonval circuit and the monopolar Oudin winding. It is best first to try the destructive action of these currents on a piece of raw meat. By this means it is easy to observe their differing action and also to determine the necessary factors such as the amount of house current permitted to enter the machine, the number of spark points to be employed and the distance between these points.

The Oudin Current

The current from the Oudin terminal may be applied in three different ways. The pointed electrode is used. When the point is brought close to, but not touching the piece of meat, and the current turned on—the sparks will fly across. This method is called *fulguration*. It will cause destruction of the tissues on the surface of the meat. This superficial destructive action can be readily appreciated when a cross section is made with the scalpel through the area treated.

The electrode may be inserted into the piece of meat and the current turned on. The tissues adjacent will then be destroyed. This method is called *desiccation*. Dr. W. J. Clark describes the microscopic appearances of tissues which have been desiccated as follows: "The cells submitted to desiccation treatment were shrunken and shrivelled and their nuclei condensed and elongated with a suggestion of cell outline, the whole assuming a mummified appearance. The blood vessels were thrombosed, and there were no evidences of hemorrhage." The desiccating and fulgurating action of the Oudin current may be intensified by grounding the piece of meat; i.e., a metal plate is placed under the meat and

connected to a water pipe or steam radiator.

The d'Arsonval Current

The bipolar, d'Arsonval current may be employed in two different ways. The method commonly followed consisted in the use of one large dispersing electrode, made of a composition metal, and the other a pointed electrode. The destructive action occurs at the place where the pointed electrode is placed. By using various parts of the meat, which are later cross-sectioned, the effect of changing the factors on the machine may be observed.

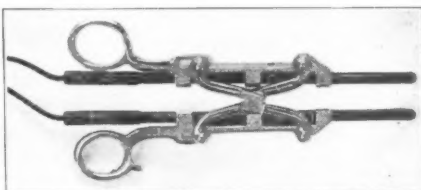


Fig. 1. Biernan's Hemorrhoid Clamp for Electrocoagulation.

The other method consists in the use of the bipolar clamp which I have devised (Fig. 1). To observe the action of this instrument, the meat may be cut into strips which can be placed between the jaws of the clamp. As soon as the white line of coagulation is seen on the surface of the meat, extending between the two active



Fig. 2. A Cross-section Piece of Meat Showing a Line of Coagulation After Application of Clamp.

electrodes, the current is discontinued. A cross section through this area will now reveal a layer of coagulated tissue lying in the plane between the jaws of the clamp (Fig. 2). By varying the current, the minimum amount necessary can readily be determined.

It is a good plan for the beginner to familiarize himself with the destructive action of the high frequency current by spending a little time conducting the experi-

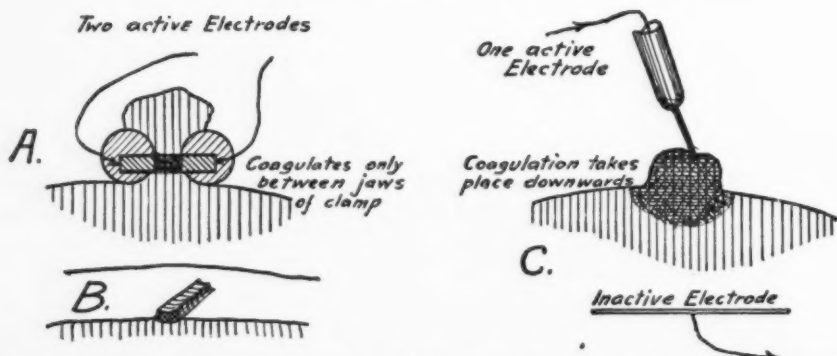


Fig. 3. A indicates that coagulation takes place only between the jaws of the clamp; B is the schematic presentation of the stump after the superimposed tissue has been removed; C shows (in exaggerated fashion) the comprehensive coagulating action of the single active electrode.

ments described. The knowledge thus secured can be put to good use in treating the various types of hemorrhoid pathology.

Selection of Method

In the actual destruction of hemorrhoid tissue, the method employed depends upon the condition present. Where there are small varicose areas, the Oudin current, applied by means of the pointed electrode, is sufficient. Wherever fulguration or desiccation is used, I usually intensify the action of the current by grounding the patient. Where larger hemorrhoids are present, I prefer to use the bipolar technic. In the presence of a definite varicose tumor, I apply the electric clamp.

After the base of the hemorrhoid is coagulated, I remove it, above the coagulated area, by means of a pair of scissors or with the needle attached to the cutting current. Where the tissue cannot be readily grasped, I apply the pointed electrode. The dispersing piece of metal is placed underneath the buttocks of the patient as he lies upon the table. With this method a diagram of the electromotive lines of force would represent a cone with its apex corresponding to the pointed electrode and its base to the dispersing metal plate.

The depth to which the tissue is destroyed is dependent upon several variable factors which cannot be accurately gauged. These factors include the amount of current used, the length of time in which it is permitted to act and the electrical resistance of the tissues. For this reason, it is better to use the electric clamp for the destruction of larger masses, because the exact depth to

which the tissue is destroyed can be determined much more accurately. In addition, there is the advantage that the hemorrhoidal mass is immediately removed; otherwise it would take about two weeks for it to slough off. Its presence in the mean time would cause mechanical irritation and a distressing odor due to the putrefaction of the dead tissue.

To the surgical mind, the electric clamp technic may be compared to that used in the clamp and cautery method. There are, however, several important differences. The ordinary surgical clamp compresses the tissue to insure hemostasis when the tissue beyond it is removed: The electric clamp

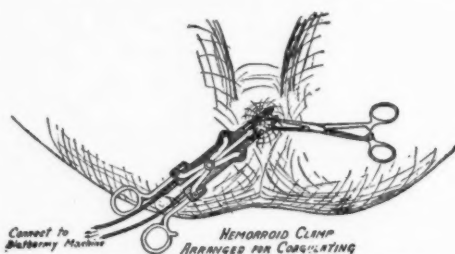


Fig. 4. Showing the Hemorrhoid Held Up by Means of an Allis Clamp, and with Diathermy Clamp in Place for Coagulation.

has no particular compressing action. The purpose of this is to insure a broad base which can be coagulated by the action of the electric current.

In the usual clamp and cautery operation an artificial tuck of skin or mucous membrane, or of both, is caused to be made, and the tissue is removed along a very thin, linear area. This area is then seared over

by a red-hot cautery. What happens, therefore, is a superficial carbonization of tissue over a thin line. With this technic, the occurrence of secondary hemorrhages may be explained by the tendency of the adjacent remaining tissue, which has thus been artificially tucked, to pull apart, the glueing action of the thin and superficial carbonized area being insufficient to hold it together.

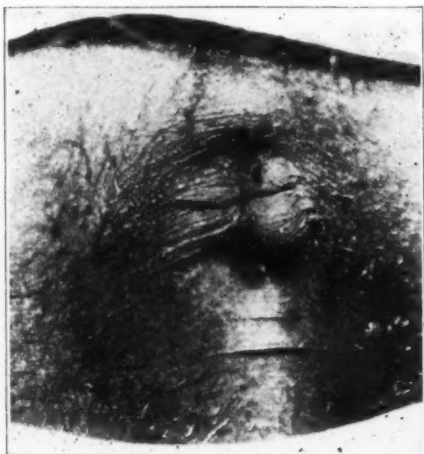


Fig. 5. A Case of Hemorrhoids, Before Treatment.

With the use of the electro-surgical hemorrhoid clamp the destructive action actually occurs within the tissues embraced by the clamp. The resistance of the tissue to the passage of the electric current of high voltage and high frequency, which is traversing it between the two active electrodes on either side of it, causes the development of heat sufficient to coagulate it. The destroyed area thus has sufficient width and depth to act as an efficient cover, holding the ends of tissue firmly together and thoroughly covering the healthy tissue underneath. During the two weeks or so before the coagulated area separates, the healthy tissue surrounding it is preparing itself to act as a new covering surface, so that when it does separate, the clean wound which is left heals over with great rapidity.

Advantages

The use of the high frequency current in hemorrhoidectomy permits the surgeon to mollify the fears of the timorous patient who refuses the usual surgical operations.

The hemorrhoid may be removed under local anaesthesia in the doctor's office, and the patient permitted to go home afterwards. This removes the dread of hospitalization.

No blood is lost during the operation.

Infection does not occur at the time of operation, inasmuch as the operation itself is a sterilizing procedure, the heat generated being sufficient to destroy micro-organisms as well as body cells.

The occurrence of embolism is precluded by the fact that there are no clots or loose tissue left in the blood vessels to be taken up by the blood stream and swept to some other part of the body. The lymphatic and blood vessel ends are sealed by the treatment.



Fig. 6. Same Patient as in Fig. 5, After Removal of Hemorrhoids by Electrocoagulation.

With proper anaesthesia, no pain is experienced during the operation. The amount of postoperative distress varies with the extent of the involved area, the sensitiveness of the patient, etc., but in general, appears to be much less than that following the usual surgical removal.

It is not necessary to use a rectal tube, nor to confine the bowels by a constipating diet.

The after-treatment of patients operated on for hemorrhoids by means of the high frequency current consists preferably of rest in bed for a few days, depending on the amount of discomfort, and the application of some soothing ointment such as butesin picrate. If there is much discomfort, it is advisable to use hot compresses of magnesium sulphate solution and if necessary suppositories containing opiates.

471 Park Ave.

The History and Therapeutics of Static Electricity

By WILLIAM BENHAM SNOW, M.D., New York City

Editor, Physical Therapeutics.

STATIC electricity was known as frictional electricity by the ancients, from the fact that the charge from the early machines was generated by friction. The term "static" applies to electricity at rest, as stored up and held in a Leyden jar or on the fields of a Holtz machine. No other electric current has greater, if as great, kinetic—actively moving—properties as the static current when discharged. The air seems ionized to this form of electricity, escaping, as it does, from its source as no charge of equal potential does from other apparatus.

The earliest reference to frictional electricity was made by Thales, who was born 691 years B.C., who by rubbing amber, then known as "electron," produced electric sparks. This is the first reference made to what we designate as "static electricity." "Electron," upon which the friction was made, originated the name by which electricity came to be known. Now in this age, with the developments of electrical science, the word "electron" in the original term is recognized as representing the unit of electricity as well as of matter.

Otto Guericke made the first electrical friction machine in 1670. This apparatus was made in the form of a sphere, and, when friction was exerted with a proper material, as it revolved electrical sparks were discharged.

The Leyden Jar

It was not until the discovery of the Leyden jars by Von Kleist, in 1745, that the demonstration of the property of accumulation or condensation of an electrical charge was recognized, or that the static property was established. Then, by charging the Leyden jars, sufficient energy was accumulated and stored from friction machines to make it possible to discharge a spark of adequate length for marked therapeutic effects from the machines of that time.

In 1750, Jallabert, professor of experimental philosophy in Geneva, published a

report in twelve chapters on the medical uses of the static spark and static insulation. This manuscript was discovered in the archives in Geneva by Dr. P. Ledame in 1885. Jallabert produced electric sparks from a friction machine with the intervention of Leyden jars. His apparatus must have been of marked capacity to have demonstrated his early experiments. He discovered that the static administrations increased the pulse rate as well as the temperature of the patient so treated. He also claimed that the electrical bath was valuable in cases of amenorrhea, and that an increased secretion of sweat and urine was induced.

Jallabert also demonstrated that paralyzed muscles treated by electric sparks responded with a convulsive movement of individual muscles wherever the sparks were applied. This was the first demonstration that the static current induces muscular contractions, independent of the neuromuscular mechanism. It is interesting to note this here as the first demonstration of what has been a contention in these later days—a property or effect which explains the peculiar efficiency of the static agencies in effecting tissue drainage with the removal of local stasis.

The use of powerful static discharges was later strenuously opposed by Abbe Nollet, himself an early exponent of their use. This was occasioned by superstitions which were aroused by their curative effects, which were not then recognized to be rational or demonstrable, but were attributed to witchcraft.

Franklin and Wesley

Benjamin Franklin and John Wesley, scientific laymen, subsequently became ardent advocates of the therapeutic use of the static sparks. The latter is quoted by Turrell as having made the following statement¹, which is quite apropos of the gentlemen of the faculty at this later day. He remarked²:

"Before I conclude, I would beg one thing (if it be not too great a favor) from the gentlemen of the faculty, and indeed all who desire health and freedom from pain, either for themselves or their neighbors. It is that they would none of them condemn they know not what; that they would hear the cause before they pronounce sentence; that they would not pronounce peremptorily against electricity while they know little or nothing about it. Rather let every candid man take a little pains to understand the question before he determines it. Let him for two or three weeks (at least) try it himself in the above named disorders. And then his own senses will show him whether it is a mere plaything or the noblest medicine yet known to the world."

The advanced ideas of these scientific laymen who had been able to relieve human suffering with the static sparks were not appreciated by the medical men. At this time, however, the rationale of the action of the static sparks had not been demonstrated. Their use was empiric, and was so even to the time that Dr. Morton's paper was read at the meeting of the American Electrotherapeutic Association, in September, 1900³.

The Holtz and Toepler-Holtz induction machines were not invented until 1865, after the plan of the electrophorus was discovered by Varley, in 1860. The electrophorus demonstrated that a glass disc, revolving parallel and in proximity to a charged field, generates a constant charge. The introduction of these types of apparatus, and later of the Wimshurst machine, made possible the production of currents in greater quantity and voltage than was possible with the friction machines.

At the Salpêtrière, in 1879, this improved apparatus was used and a new interest was aroused in its employment by scientific physicians.

The Charcot Clinic

In 1879 Dr. Wm. J. Morton became interested in electrotherapeutic apparatus, and made an earnest study of the various methods employed in Charcot's clinic by Vigoreux. I believe, however, that in the Charcot clinic not much was evolved farther than that Dr. Morton's investigations led to the introduction in this country of improved apparatus, if we are to judge from the present status in that clinic.

When Dr. Worthington S. Russell and I visited the Charcot clinic, in 1911, it was under Dr. Zimmerman's management. We found in operation one Wimshurst machine with two revolving plates five feet in diam-

eter. The plates were revolved in a closed case; and, as I have previously reported, static electricity, as employed in that clinic at that time, was a remarkable compromise of the modern point of view and established therapeutics of electricity.

In a large outer waiting room were hundreds of poor patients who were waiting for relief. These were marched into the static room about twenty at a time and placed upon as many insulated platforms which were connected in two rows with one pole of the machine.

A nurse with a metal electrode, which was attached to a ground chain, in hand then rubbed a few strokes, administering friction sparks, on the backs of each of those on one row of platforms, and upon the knees of those on the other row, after which the patients filed out and another group took their places. This very unscientific procedure, and unaccountable in this once famous clinic, explains the skepticism of our visiting neurologists who go there for enlightenment and, perchance, take their cue from what is done with static electricity there.

Clinical Results

In a paper read before the American Electrotherapeutic Association in 1901⁴ I first called attention to a demonstration which I had made during the previous year in the treatment of a young man's hand, sprained in the gymnasium, when, in falling, he had sustained his body weight upon the extended right hand and sprained the carpometacarpal articulations. The swelling and pain in the hand, on manipulation, was so great that he refused to permit handling, and could not close or use the hand. The x-ray disclosed the fact that there had been no fracture, and with an application for one-half hour of the static brush discharge, applied over the back of the hand where the swelling was considerable, it very nearly disappeared during the application. That result disclosed the fact that what we accomplish with the static agencies is the early removal of exudations, before hyperplasia, occurring with local inflammation, when arising from trauma or other causes. The only exit for such infiltration once in the lymph spaces is by way of the channels of circulation. The successive contractions, induced locally in the tissues and muscle cells, forced the accumulated cells on through the outlets, and the local swelling

disappeared. The same treatment on the following day gave complete relief. To one who had contended for days and weeks with sprains, this was a revelation.

Physiologic Action

The question has often arisen why we should not expect to obtain the same result by stimulating muscular contraction through stimulation of the neuromuscular mechanism at the motor points. Experiment, however, has disclosed the fact that such stimulation will not effect the removal of exudations. In the case reported the mildest of all of the static methods was employed for inducing local tissue contraction for tissue drainage. The same or deeper effect is obtained with the static wave current, and in deeper tissues with the static sparks.

The uninterrupted static current¹ from the influence machines is in every respect a directional current, as is the constant current—the galvanic—and, as such, delivers positive from one pole and negative from the other. It is a constant current of high voltage and small amperage, and, as such, produces, when interrupted, the same effect upon muscle cells as the low voltage galvanic current, plus the effect of high voltage.

The experiments of Claude Bernard² long since demonstrated the independent contraction of muscle cells when separated from the living body by the passage of interrupted currents of galvanism to the cells. Howell³ and all other authorities have shown the same effect of the constant current on muscle cell stimulation. With the low voltage current, however, it must be applied directly to the muscle cells and could not otherwise induce contraction beneath the resistant skin; whereas, the static current of high voltage overcomes the skin resistance and so produces independent muscular contraction of the cell mass. This is proved because the tissues respond in an infinitely shorter time than the neuromuscular mechanism can be aroused by reflex stimulation through the motor points.

It is this independent contraction of the muscle cells which calls forth such responses, when applied to infiltrated tissues, that causes contraction of all cells so stimulated, and so expels the infiltration from inflamed tissues. Under observation, this may be demonstrated in all superficial cases and by the relief of pain and swelling in

the more remote tissues to which the static wave current and the static sparks are applied. We can find no objection that will disprove the correctness of this point of view, in the face of visual observation and subjective findings.

That other currents which produce contraction of the muscles do not effect a similar result, acting, as they do, through the neuromuscular mechanism, is due to their failure to induce independent cell contraction. These effects, therefore, cannot be accomplished with the currents of low voltage. Hence, the means of relief of a local infiltration must depend upon stimulation with the high-potential, constant current of very small amperage—the static current—which, acting as a local stimulus to the cells, effects the removal of infiltration wherever present in swollen tissues.

The only contraindication for such administration is its indiscriminate application over malignant tissues and to parts the seat of local infection.

The clinical results in the treatment of all manner of inflammatory conditions to which the static discharges are adapted is so remarkable that what is said of the effects is not credited by those who have not observed the results of static administrations.

There is no other effect which could explain the relief afforded the local conditions and symptoms of traumatic injuries but that given, and the indication in those cases is self-evident to all who are familiar with the subject.

A comparison with statements of authorities who employ other methods will illustrate marked contrasts with similar cases as reported.

The three important physiologic effects of the static currents are as follows:

First, the effect described of removal of infiltration and exudation that engorges the tissues following an acute trauma or arising from toxic foci, including cases of rheumatism, rheumatoid arthritis and other toxic arthroses. In those of toxic origin, at the same time, trouble at the focus must be removed.

Second, there is no method so effective in removing muscular tension, always present with inflammatory conditions, but never to be employed over areas infected locally or in malignant cases.

Third, the effect on general metabolism derived from the active surging of the cur-

rent to-and-fro through the body during the process of administration, is remarkable.

These three effects are reasons why static electricity fills an unequalled role in the treatment of inflammation not associated with local infection and for the general effect upon metabolism.

In a recent issue of the *Therapeutic Gazette*³ appear the following statements, undoubtedly with the authority of the eminent editor of that journal:

"The nutrition of all tissue, and its healing when traumatized, depend upon the free circulation of the blood. In a part at rest the blood flows sluggishly and metabolism is at a low ebb.

"Bruises, sprains and the myositis incident to acute overuse are all helped toward a speedy recovery by massage and use, short of causing severe and lasting pain and inflammatory reaction. The benefit accruing from this treatment is incident to the better circulation thereby insured.

"The stiffening and painful joints of the aged, due in the main to the bone deformities of rheumatoid arthritis, are best treated in the same way; use prevents adhesions and brings about an adaptation to the changed anatomy."

It will be observed from these remarks that a condition exists which all recognize—local stasis with infiltration—and that the principle and intent is to restore circulation, which can rarely be accomplished, in tender swollen parts by means of massage, without further aggravation of the condition. Neither will reflected incandescent light and heat restore circulation after stasis is once established.

As for the relief of an acute condition, in an editorial on "Acute Arthritis," the treatment prescribed is rest:

"Traumatism of a joint, either due to direct impact, as from a blow; by a bruising force, as from a heavy jar incident to a jump from a high place; or a twisting strain, are followed by an inflammatory reaction characterized by an effusion into the joint, which is from the first sterile, and usually so remains. The accepted treatment of this effusion is by splinting, elevation (if this be practicable), pressure bandage and the application of evaporating lotions. As the effusion subsides, massage, counter-irritation, pressure and rest are the usual means of hastening resolution. This method of treatment, in so far as ultimate return to normal is concerned, is usually successful.

"It is obvious that recovery from all abnormal joint conditions is dependent upon a free circulation of blood in its vessels. It is equally clear that a large effusion into a joint interferes with this free circulation, and that the interference is proportionate to the extent of the effusion. It would,

therefore, seem logical to relieve this pressure and thus encourage proper circulation by removing the fluid, providing this can be done with safety and without any greatly added traumatism.

"Thus Whitman advises aspiration when the traumatic effusion of the joint is sufficiently large to cause pain or obvious distention; and repetition of the aspiration is urged, should there be a return of the effusion to such an extent as to occasion the conditions described."

These editorials, from which the above quotations are copied, contain references to other authorities advising aspiration of the fluid after it occurs in a traumatized joint. As a recent statement from an authoritative publication, the quotations well portray the present status as to ways now in vogue with the orthopedist and surgeon for the treatment of traumatized joints, and it is in this connection that we would emphasize the fact that there are indeed very few cases of this sort, if there is no fracture or rupture of ligaments, in which the static currents will not give prompt relief within a very few days. Under these circumstances effusion will never occur. Furthermore, if the condition comes under observation with the effusion already present, the same methods of application in relatively early cases will disperse it promptly, as in conditions of infiltration in the swollen muscle.

Illustrative Cases

The following cases will well illustrate this principle:

Three cases of severe trauma, one in a young surgeon in the Medical Corps who was thrown from his horse, and the two others in polo players, likewise thrown from their horses. In each instance they severely injured a shoulder joint and came under observation the day following the accident with complete disability and marked swelling at the shoulder, and with the arm bandaged to the side by a surgeon. With four treatments for two of them, and two treatments in the other case, they were relieved of all disability, swelling, pain and discomfort. The parts were normal. The treatments consisted of twenty minute application of the static wave current with metal electrodes adjusted to the swollen parts, followed by an application of static sparks over the joint to relax all tense muscles.

These cases indicate the prompt relief that can be obtained by the use of the

static wave current and static sparks applied to this class of traumatic injury and can be duplicated, under good management, in all cases elsewhere of simple trauma, as sprains and contusions and following dislocations.

The two following cases well illustrate results after dislocations:

A gentleman, when playing golf, turned quickly and dislocated his knee joint. After reduction the following day, he came for treatment with great pain and disability. The first treatment with the static wave current and sparks, applied as in the shoulder cases, so relieved the condition that he walked with little pain. One subsequent treatment restored the part to normal.

A football player, while walking down the campus, turned suddenly and dislocated a knee joint. He came to the office on crutches. After the first treatment on the following day he came in with a cane, and after the third treatment was able to kick a goal. In other words, the relief was complete.

These cases well illustrate the results which are always duplicated in traumatic injuries without fracture of the joints—ankles, elbows, shoulders, knees or elsewhere—which we are convinced could not be accomplished in a much longer period of time by any other electrical or other agency or by rest or any other method of treatment. These are instances in which we must use the static currents to obtain prompt relief.

Conclusions

1.—The peculiar effects of the static current are derived from the fact that it is a direct or constant current of high potential and therefore possesses the character-

istic qualities of the constant current in inducing direct muscular contraction of the muscle cells.

2.—The effects of the static current important in therapeutics are:

A.—The mechanical removal of infiltration from engorged tissues where no infection is present.

B.—It produces complete relief of muscle tension when applied, thereby overcoming muscular contraction associated with the inflammatory processes.

C.—With the general administration of the current from one pole, it has a remarkable effect in improving local and general metabolism.

3.—There is no other electrical current at present available possessing the same characteristics and capable of the same therapeutic effects as the static currents; and, from the fact that it is so remarkable in its influence upon inflammatory conditions, it is indispensable for prompt and complete relief of those conditions.

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Hyperinstrumentalism

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AN old medical friend of mine, 80 years of age, at a medical meeting recently made the remark that, in this day, we are inclined, as medical men, to suffer from an increasingly prevalent disease, which may be described by the word "Hyperinstrumentalism." The term seems apt.

In a recent issue of the *Journal of the American Medical Association*, under "Tonics and Sedatives," appeared a quotation of a clipping from a local newspaper, which read something like this: "Wanted, for country practice, a doctor who is not too high-brow, and who is not too busy, and too much of a specialist to come to see people who are just plain sick."

The value of the instrument of precision is unquestioned. The thermometer, the stethoscope, the test-tube, instruments for determining basal metabolism, and the varied laboratory methods now in common use are of remarkable utility in determining the nature of disease. Instruments for exploring the depths of the human body, the x-ray machines, the armamentarium of the physical therapist, with its varied equipment, all have their places in scientific medicine. All of these things have made contributions to the study and treatment of disease, and have been expressions of the remarkable advance in medical sciences.

But may it not be true that too much dependence is often placed upon certain mechanical and laboratory tests? And is not the tendency, nowadays, to forget the patient in the maze of paraphernalia which makes up the modern physician's office equipment? Hundreds of years ago, Socrates said, "There is no cure for the body apart from the soul; and the reason why so many diseases elude the physicians of Greece is that they know nothing of the soul." Did not the old Greek sage have the germ of wisdom in all medical treatment when these words were spoken?

At the present day, we do not possess all the knowledge of the human race. The ancients had much, which we must not despise. The wisdom of Solomon still holds good. When he said, "A merry heart doeth good like a medicine," he was but making a

preface to the remarks of Socrates, quoted above.

As practitioners of physical therapy, we must be especially careful, I think, of contracting the disease of "Hyperinstrumentalism." It seems easy, with the multiplicity of machinery and instruments, to fall into the error of thinking that we can press a button, turn on a current, and relieve every pain and cure every ill to which flesh is subject.

Instruments can never take the place of intelligent diagnosis and intimate study of the patient himself. The five senses of the physician should be the leading means of becoming acquainted with the patient and his disease, and the human brain must be used to its utmost potentiality rather than relying blindly on instruments, however necessary the latter may often be. We know that laboratory tests are sometimes deceptive; the reactions of different individuals vary greatly. It is only by a combination of our reasoning powers and the use of scientific instruments that we may best serve the members of the community who are "just plain sick."

It may not be easy, as Socrates suggests, to "know the soul," but the fact remains that the modern physician too often ignores the intricate relationship of mind and body, and forgets that the health of the one mysteriously influences the health of the other. Psychotherapy may be a difficult term to understand. It is certainly an abused one. My plea is for the conscious possession, on the part of the physician, of a wholesome, helpful, cheerful and encouraging attitude to his patients, and for the development of a personality that brings cheer and faith to every sick room into which he may be called. All of us know of the old family doctor of a generation or so ago, of whom the people said that even his presence and the sound of his coming footsteps gave new hope and comfort to his patients. There was something about his personality that "did good like a medicine."

Human friendliness and sympathy cannot be replaced by machinery and instruments of science, however valuable and

necessary these may be. There must be a judicious combination of the two, and a balanced proportion of skill and personality. Patients are not things, but human beings. We may not measure by the tape lines or test tubes their fears, sensibilities, or susceptibilities to sympathetic suggestions. Instruments are adjuvants to successful diagnosis and treatment, but they are not, after all, the *summum bonum*.

The practitioner of physical therapy is perhaps tempted to be a "hyperinstrumentalist." He may easily fall into the error of depending upon a multiplicity of machinery to the exclusion of all other forms of medical and surgical treatment, and to make of his instrumental methods a cure-all for every human ailment. Careful and painstaking diagnoses are fundamentally important. If medicine and surgery are clearly indicated, those agencies should be used. Let us not be "the first to put the old aside." Only when there is definite indication for physical therapeutic agencies

should choice be made of those methods.

In the chemical, thermal and mechanical effects of physical therapy, we have powerful agencies for the treatment of a large variety of human disorders. The tonic and life-giving effect of the ultraviolet is unquestioned; the values of the numerous forms of heat at the disposal of the physical therapist are remarkable in their wide range of beneficial application. Massage, passive and active exercises, the galvanic and high frequency currents are all clearly indicated in many pathologic conditions—but not in *all*. Discrimination and selection are necessary.

Medicine is rich in its wide and time-honored possibilities for the relief of disease. Physical therapy is its hand-maiden to serve when indication is clear and unmistakable. The hand-maiden should not be overworked, but called upon only when conditions are suitable for her services.

Beware of the age of "Hyperinstrumentalism!"

Mechanical Vibration, Its Uses in Medicine

By MARY L. H. ARNOLD SNOW, M.D., New York City

MECHANICAL vibration in medicine as a measure of relief for the cure of disease is worthy of that recognition which its physiologic actions and therapeutic results indicate. It is neither a passing fad nor a placebo. Like other therapeutic agencies, mechanical vibration has a broad field of usefulness occupying a special place in medicine, being particularly adaptable to all selective conditions amenable to massage and spinal stimulation.

As every ailment has a pathologic basis which must be eliminated, or whose progress must be arrested in order that there may be a restoration of the normal functional activity of the part involved, it is necessary to consider the physiologic effects of mechanical vibration to meet the requirements of pathologic conditions as found.

According to the technic employed, as variations in speed, length of stroke, degree of pressure—light, moderate, or heavy—it

can affect every tissue and organ with varying intensity.

Mechanically it stimulates the circulatory and lymphatic systems and consequently is concerned in metabolic processes as affecting the functional activity of a part by the removal of stasis. Its use is therefore indicated in all non-infected inflammatory processes.

Care and precision in method are necessary, with careful selection of the vibratodes employed, using in each instance the one adapted to the particular site or part in question. Regulate the speed according to the condition treated, stroke according to the site affected, and the pressure according to the degree of inflammation present. The length of time of application is measured by the patient's reactionary powers.

Mechanical vibration improves respiration, thereby increasing oxygenation. Excretion as well as secretion is stimulated.

It promotes the removal of extravasations, exudations, and transudations. Minor adhesions are favorably affected, making it particularly useful after fractures or in joint conditions, its indications for use being limited by an increase of the inflammatory process.

Physiologic Actions

Chemically, mechanical vibration assists in the interchange of oxygen and CO₂, as when we induce a lung reflex of contraction.

Thermically, it affects the body through vibratory friction which increases heat elimination. Through deep, interrupted vibration it acts upon muscles and increases heat production. Cutaneous and vasomotor stimulation affect the storage of heat, as contraction of the skin and its blood vessels diminishes the heat evolved, and if they dilate heat is increased. Since mechanical vibration is effective in regulating bodily heat, indirectly it affects the immunity of the body.

Physically, respiration is affected by mechanical vibration.

Reflexly, effects are produced through nerve stimulation or inhibition of the cerebro-spinal, sympathetic and adreno-thyroid systems.

The effects of mechanical vibration on the circulation vary with the method of application and the conditions presented. Many authors—Zander, Bechterew and Colombo—believe that vibration first causes contraction of the blood vessels with a consequent rise of blood pressure, although some believe that a subsequent dilatation with resultant fall of blood pressure may follow.

In our experience the blood pressure may be made to rise or fall according to the spinal site selected for the application of the ball vibratode as used for spinal vibratory treatment. It is effective in the treatment of hypertension.

In the treatment of splanchnic relaxation, a condition characterized by a reversal of the normal relation of blood pressure, tenderness of the liver, mental depression, accumulations of gas in the bowels, and often a splanchnoptosis, mechanical vibration is a valuable aid, in connection with other physical measures as conditions require. The static wave current is always used in these cases to increase hepatic activity, unless contraindicated when dia-

thermy is employed. The accompanying pathologic states must be treated as the condition requires, as radiant light and heat, ultraviolet rays and the sinusoidal current. The ball vibratode applied in the intervertebral spaces from the second to the sixth dorsal vertebra, alternately on each side from above downward and repeating for five minutes, gives most gratifying results in establishing a normal relation between the blood pressure when taken with the patient lying and sitting. The underlying cause of the condition must be treated as indicated to maintain the equilibrium established by vibratory treatment.

On the heart, mechanical vibration has a stimulative or inhibitory effect, varying with pressure and time. Directly over the heart by means of the disc vibratode, or the ball vibratode in the intervertebral spaces between the seventh cervical and the first dorsal vertebrae, it will induce a reflex contraction of the heart and increase its tone, hence its use is indicated in myocardial insufficiency, or to revive a fainting subject. The result may be duplicated by a two minutes vibratory application, interruptedly, with the ball vibratode in the intervertebral space between the seventh cervical and first dorsal vertebrae, alternately on each side. The pulse rate may be lowered through vibratory treatment with the ball vibratode in the interscapular spinal region or regulated reflexly otherwise through other spinal vibratory applications.

Aneurysms, aortic dilatations (non-organic) are also favorably affected to contract by a two minute vibratory treatment with the ball vibratode applied in the intervertebral spaces with short contacts alternately from side to side between the seventh cervical and first dorsal vertebrae.

Therapeutic Applications

In the treatment of a cold, and also in the treatment of sinusitis, or hay fever, spinal vibration is effective. It may also supplement the use of diathermy, ultraviolet, indirect d'Arsonval or the Oudin or static current.

It may be used as an accessory in the treatment of goitre, either by direct applications to the gland, or by reflex spinal stimulation, probably affecting the blood supply of the thyroid.

In the treatment of splenic enlargement, when not due to infection, it is an indicated

agent, as by applying the ball vibratode in the intervertebral spaces, alternately on each side of the spine between the first and second and second and third lumbar vertebrae, for ten minutes, a reflex splenic contraction is induced.

Probably one of the most satisfactory uses of mechanical vibration is in the treatment of *bronchial asthma*. The application of the ball vibratode in the intervertebral spaces between the fourth and fifth cervical vertebrae for ten minutes, using moderate pressure, induces a reflex lung contraction, clearing up the rales and giving the patient marked relief. Of course, underlying causes must be treated, as well, to effect a cure.

Mechanical vibratory treatment, by relaxing affected muscles, removes or diminishes pain, tenderness and stiffness. Through its circulatory effect it may develop an atrophied muscle or increase the tonicity of a flaccid or relaxed muscle. The muscle becomes firm, more elastic, and more healthy. In many cases exercise, combined with vibratory treatment, assists in regulating functional cellular activity. They assist in the elimination of waste products and have an effect on the amount of adrenoxidase in the body.

It has been demonstrated that electro-excitability may be increased by mechanical vibration. Contracted muscles may be made to relax in response to prolonged vibratory treatment. It is therefore indicated in the treatment of wry neck and wherever contractions are present, as with rheumatoid arthritis.

In the after-treatment of fractures it relieves the edema and hastens recovery in two-thirds of the usual time.

Through reflex activities induced or by its effect on the blood supply or muscles, it is useful as an auxiliary measure in the treatment of migraine, glaucoma, neuritis, referred pain, chorea, and locomotor ataxia.

Mechanical vibration is most useful in its application to the digestive system in the treatment of constipation, either by localized spinal vibratory treatment with the ball vibratode or by the application of the disc vibratode, applying it with strokes of increasing length, first over the descending colon, then the transverse and lastly upward over the ascending colon, finishing with the cap shield, applied so as to give a cannon ball massage. Sometimes associated

internal rectal vibratory treatment and even enemas are given.

Uses in Diagnosis

It supplements the use of other diagnostic measures in that it determines:

- 1.—The presence and site of inflammation and pain.
- 2.—The degree of tissue irritability.
- 3.—The presence and degree of muscular spasm.
- 4.—The range of mobility of a joint.
- 5.—The state and degree of efficiency of various reflex functions.

Spinal reflexes elicited by mechanical vibration or any other physical agency are of importance diagnostically and therapeutically.

Spinal vibration with the ball vibratode, applied in the intervertebral spaces alternately on each side between the seventh cervical and first dorsal vertebrae, elicits a reflex contraction of the heart unless pericardial effusions are present. It also favorably effects cardiac weakness. Vibratory treatment when given between the second and third, and third and fourth dorsal vertebrae usually lowers blood pressure if the case is uncomplicated.

The lung reflex of contraction is induced by a ten minute vibratory treatment in the intervertebral space between the fourth and fifth cervical vertebrae. The reflex of dilatation is induced by vibration in the intervertebral spaces from the third to the eighth dorsal vertebrae. Its absence is an early sign of pulmonary tuberculosis.

The stomach reflex of contraction is elicited by applying the ball vibratode for ten minutes in the intervertebral spaces from the first to the third lumbar vertebrae, alternately from side to side and from above downward. By it the association of a growth or sensitive spot in the structure of the stomach may be shown.

When an organ is examined, interrupted vibration with the disc vibratode should be used with varying degrees of pressure governed by the patient's tolerance. Apply the vibratode gently, but firmly, with gradually increasing pressure to elicit pain if present. A sensitive ovary, gall bladder, pylorus or congested spleen, liver, stomach, or intestines, may be noted by the use of vibration with the disc vibratode.

Sometimes, obscure conditions are noted, as a persistent bilateral interscapular ten-

derness may suggest tuberculosis, before any marked clinical symptoms are observed. A radiograph confirms the diagnosis. Nerve tenderness may require an analysis, as tenderness found between the sixth and seventh, seventh and eighth, and eighth and ninth dorsal vertebrae on the left side is suggestive of stomach disorder, which in turn requires a radiograph for confirmation.

Mechanical vibration should be employed to meet a demand, and so applied as to restore normal functional activity. Results with mechanical vibration depend on a knowledge of anatomy and physiology, keen diagnosis, and a knowledge of its

effects and scientific application and a recognition of its select adaptability to ameliorate or relieve conditions presented. Such conditions prohibit its indiscriminate use in the hands of the laity or those untrained.

Summary

1.—Correct technic is essential for definite results.

2.—Mechanical vibration acts mechanically, chemically, restrictedly, thermally, physically and reflexly.

3.—Its application in medicine must be selective, based on its action and the pathologic conditions present, to secure definite results.

High Blood Pressure, Its Significance and Treatment

By BURTON BAKER GROVER, M.D., Colorado Springs, Colo.

NOTWITHSTANDING the triteness of the subject there remains much to be learned of the significance and therapeutic management of high arterial tension.

While blood pressure is a necessity, it must remain within physiologic limits if health is to be preserved.

The physiologic limits of the variations in the systolic pressure are wide. The systolic pressure, contrary to common belief, is not constant; it varies under many circumstances and conditions, such as exercise, sleep, posture of the body, digestion, mental activity etc. There are also variations in the pressure in different localities of the body. Under the various demands of the different organs of the body the pressure varies, not only from day to day but from hour to hour. However, from examinations of thousands of individuals in health, normal variations in blood pressure have been accepted as follows: systolic from 110 to 142; diastolic 74 to 90; pulse pressure 24 to 55; pulse rate 70 to 86.

The systolic pressure taken alone is of little significance. A diastolic of 120 has a greater significance than any reading of the systolic. Pulse pressure, the significance of which is stressed by many observers, does not impress the writer as being nearly so important as the diastolic. However, to paint a satisfactory picture all

pressures must be considered in connection with the pulse rate.

The old dictum that the normal systolic pressure may be estimated roughly by the formula, age plus 100, is, to say the least, decidedly inaccurate. Of all the factors influencing blood pressure, age deserves the least consideration. It is generally recognized that added years may add changes in the arterial tree, not by reason of age alone, but by reason of inside and outside influences, such as overexertion, errors in diet, faulty hygiene, etc. There is no good reason for an individual at the age of 70 years to experience a blood pressure materially higher than at the age of 25 years. However, being aware of man's indiscretion, we naturally assume that the blood pressures of men at 60 years of age are higher than we expect to find in younger individuals.

Classification

There is an etiology back of all functional disturbances; so is there etiology back of hyperpiesis. However, we classify cases of *hyperpiesis* as those in which there are no discoverable pathologic changes; and those of *hypertension* where there are discoverable morbid changes.

Etiology

While we are tentatively assured of certain factors being associated with hyper-

piasis, we are unable to point to any one with a definite assurance of being right. Yet, we feel that the time is not far distant when the causative factors will be discovered and measures taken that will prevent the development of conditions which are responsible for a mortality greater than that of cancer and tuberculosis combined.

While there is yet much to be known about the causes of high blood pressure, we are gradually learning. We are learning that there is something to do besides telling a patient that his high blood pressure is nature's method of compensation. While it is true that the human mechanism is capable of maintaining reciprocal adjustment between heart and blood vessels and does maintain a circulatory efficiency for a long period of time, there comes a time when the compensatory effort fails and the high pressure becomes a causative factor in arterial degeneration.

Among the factors in the etiology of heart disease, and probably one more or less responsible for the increase in death rate, may be mentioned, "Americanitis," a too strenuous life. While it is true that the expectancy of man's life has been prolonged during the last quarter of a century and more people live to the age when heart disease is most common, it is equally true that the disease is on the increase in persons under forty years of age.

It is well known that in early life infections play an important part in crippling hearts, to be recognized later in life. When periodic health examinations become the routine work of the family physician the effects on the heart of early infections will be recognized and through preventive measures crippled hearts and arteries will gradually become less as the years go by.

Through periodic examinations, the first rise in blood pressure will be noted and recorded. If upon the second examination the pressure has advanced to maximum normal, physical agencies, in conjunction with the adoption of a plan of living that common sense will suggest, will do much toward warding off hyperpiesis, the first aid to hypertension and cardiovascular disease.

The life of an individual with hyperpiesis does not depend so much upon the height of his blood pressure as upon his inherited tendency. If he be well born he may carry a high vascular tension for many years

without serious inconvenience. On the other hand, he often succumbs to the weakness of his forebears which tends to cardiac failure, a giving way of the smaller blood vessels of the brain or the complications of nephritis.

Heredity is an important factor in the possession of a good quality of arterial tubing, but as it is difficult to choose one's forebears one must cheerfully accept the traits transmitted to him. However, a man can so live that those coming from his loins will not bear the stings of an outraged heredity.

There is a direct relationship between high arterial tension and arteriosclerosis. High arterial tension being the parent of arteriosclerosis means that measures taken for the prevention of the former apply to the prevention of the latter.

Builders of automobile tires who desire to retain a good reputation are very careful in the selection of rubber. While a child cannot select his own arterial tubing his early days may be guarded from infections and his conduct guided along paths of safety whereby a poor quality of arterial walls may be made to endure for many years.

One of the etiologic factors in high blood pressure is the following of advice along the lines of so-called physical culture, home exercise and "tumblest" propaganda set forth in magazines and newspapers of the time.

How to keep young is a problem not easy of solution. While regular exercise is essential to health and of great importance to those who possess a poor quality of arterial tubing, the individual whose occupation has been more or less sedentary for many years and who starts at the age of 50 or 60 to prolong life through the adoption of calisthenic stunts will soon realize the fatuity of his efforts.

It may be said that a blood vessel is a living entity, capable of contraction and expansion, these functions being under direct control of the nervous system. While the heart is a great factor in stressing the resiliency of blood vessels, its function depends upon a well-balanced nerve control; consequently, may it not be true that an important factor in the etiology of high blood pressure lies in dysfunction of the sympathetic nervous system? While there is a recoil following stressed resiliency, the muscles of vessel walls cannot contract

without an impulse reaching them through a nerve of the vegetative system.

Interpretation

There can be no disease of the arterial tree without some evidence of its existence being presented by the sphygmomanometer, the readings of which, when properly interpreted, will visualize a picture of cardiovascular conditions which, prior to its discovery, was an undeveloped film. The knowledge gained through proper interpretation of its readings enables us to foresee the changes yet to come in the cardiovascular system. If, during the period of

hyperpiesis or "presclerosis," we are provided with modern agencies, pathologic changes may be averted.

A high systolic pressure suggests functional disturbance; a persistent high diastolic pressure suggests pathologic changes. A picture presented by the systolic and diastolic pressures is not complete without comparing them with the pulse rate.

The following charts present the rising and falling ranges of the systolic and diastolic pressures in relation to each other at various pulse rates, in connection with the conditions which they suggest.

CHART I
Blood Pressures

	Systolic	Diastolic	Pulse Rate
Normal	112-142	74-90	70-86
High	142-190	90-110	86-120
Very high	190-280	110-170	120 plus
Low	90-110	50-72	50-70
Very low	60-90	50 minus	50 minus

CHART II

Systolic	Diastolic	Pulse rate	Interpretation
Normal	High	High	Poor myocardium.
Normal	Low	Low	Overworked heart
High	High	Low	Incipient hypertrophy
Normal	Very low	Low	Aortic insufficiency.
High	High	Low	Intracranial tension, cardiorenal disease; points to apoplexy.
Very high	Very high	High	
High	High	High	Failing heart; cardiovascular changes.
Very high	Very high	High	
Low	Normal	Normal	Neurosis.
Low	Normal	High	Weak heart, tuberculosis or other infection.
Low	Low	High	Weak heart, anemia, Possible tuberculosis.
Low	Very low	High	
High	High	Normal	Cardiovascular strain; incipient cardiorenal disease.
High	Normal	Low	Hyperpiesis.
High	Normal	Normal	
Low	Very low	Low	Toxemia; cardiac failure.
High	Low	High	Look to the thyroid.
High	Normal	High	Neurasthenia.
High	Normal	High	
High	Very low	Any	Failing heart.

In hyperpiesis in the young individual with high systolic pressure, the diastolic is liable to be low on account of the non-impairment of the vessel walls. There are few exceptions to the rule of requiring several years of high systolic pressure to induce pathologic change and its index—high diastolic pressure.

Whenever the systolic pressure begins to fall and the diastolic begins to rise the heart is in a state of fatigue, and if balance in the pressures is not restored it will soon fail altogether.

High blood pressure with cardiac hypertrophy does not always mean kidney involvement. However, in cases of hyperpiesis of long standing, there is generally some degree of albuminuria and an increase in hyaline casts. As the case progresses there is a further increase in these urinary constituents, granular casts become more or less plentiful and retention of urea is increased.

Cardiac hypertrophy is not a factor in incipient hyperpiesis, several years usually being required for high blood pressure to cause cardiac hypertrophy.

The early symptoms of hyperpiesis are too vague to be of much importance in diagnosis. A victim seldom suffers and is more apt to say, "Never felt better in my life". He does not seek the advice of a physician until he has passed the hyper-pietic stage and entered upon that of hypertension. This fact stresses the importance of periodic health examinations.

Commercially speaking, we have become accustomed to liability insurance. Why not underwrite high blood pressure through the agency of periodic health examinations?

Treatment

Like a thief at night high blood pressures stealthily creep on, yet, for a time, the circulatory system gradually adapts itself to them. While the idea prevails that such pressures are compensatory and should not be interfered with, it is the belief of the writer that the earlier the date of discovery of high arterial tension and the adoption of common-sense measures toward their control the fewer will be the number of circulatory accidents. Why sit idly by and watch the pressures go higher and higher when we have agencies at hand to reduce the pressures to normal gradually and gently?

The writer knows of no more fertile field of preventive medicine in which the

physician can do so much valuable work as in that of incipient high blood pressure.

The common practice of prescribing a non-protein, salt-free diet, with a morning dose of magnesium sulphate, will not accomplish much in the prevention of pathologic changes in the arterial tree. Non-protein nitrogen concentration in the blood does not cause a rise in blood pressure nor does a low protein diet influence the concentration of blood nitrogen.

Dietophobia is pandemic. Regardless of all discussion pro and con of the effects of proteins on blood pressure, a well balanced diet of proteins, carbohydrates, fats, vitamins, water and mineral salts is essential to proper growth and repair, and a common-sense choice of food which possess these essentials yields best results. A stereotyped dietetic management of high arterial tension, except in cases of allergy, has been proved a dismal failure. The quality of food intake is not so important as the quantity. The diet should be the minimum quantity compatible with health. Only bad effects come from starvation. Large quantities of fluid intake, except where they increase urine flow, aggravate high blood pressure.

Baths that produce diaphoresis, as a general rule, are useful in hyperpiesis, but not in hypertension.

Autocondensation

While autocondensation is not a *sine qua non* in high arterial tension the experience of the writer teaches that the benefits derived from its use equal those of all other measures combined. Why is autocondensation a great factor in the reduction of blood pressure? Because it stabilizes the sympathetic nerve system which controls vasomotor, secretory and peristaltic functions; increases the electrical response of lipoidal structures of tissue cells, which induces chemic change; increases oxidation of nitrogenous matter in the body; hastens the elimination of waste products; increases leukocytosis; and attenuates the virulence of bacteria. Under treatment by autocondensation, it is surprising to note the remarkable improvement, both mentally and physically, that takes place, due to the removal of cardiovascular strain.

One of the world's most skillful cardiologists, the late Clifford Allbutt, said, "Autocondensation is, I believe, the most valuable immediate aid we possess for hyperpiesia. It is true that it does not,

so far as we know, counteract the direct cause or causes of the malady; but until we know the primary causes we may be thankful to counteract the secondary."

The effects of autocondensation in all cases of hyperpiesis are quite prompt and, in most cases, lasting. Failure of autocondensation in high arterial tension comes from: (1) an imperfect understanding of the physics of high frequency currents; (2) poor diagnosis; (3) inefficient apparatus; (4) bad technic; and, (5) want of persistence or too early cessation of treatments. As a discourager of pathologic changes yet to come, in the cardiovascular system, autocondensation has no peer. The success of autocondensation in hypertension depends largely upon the damage already done.

Autocondensation technic must be varied in accordance with the condition of the patient. A fat patient with hyperpiesis requires an entirely different technic of application than does a thin, desiccated piece of humanity with arteriosclerosis. The treatment of a case of hyperpiesis must necessarily be different from that of one with a kidney disease.

The fact should not be overlooked that every person with a persistent hyperpiesis is a candidate for future sclerosis.

In the treatment of high blood pressure, following a physical and laboratory examination, a method is outlined which consists of advice regarding diet, exercise, work and play. Before autocondensation treatments are invoked a formula of high frequency factors is outlined, the essentials of which are: (1) type of current; (2) voltage; (3) amperage; (4) frequency; and, (5) time.

Generally, cases of hyperpiesis are given currents of quantity, medium voltage, medium amperage, low rates of frequency and time 12 to 15 minutes. Cases of hypertension are given currents of tension, voltage high, amperage low, frequency high and time short. These factors are all subject to change to suit the case in hand.

While autocondensation yields more or less brilliant results in hyperpiesis it does not necessarily follow that equally good results obtain in hypertension. The treatment of high arterial tension by autocondensation without individualization of the patient will prove a dismal failure.

219-221 Ferguson Bldg.

Hydrotherapy

Its Value and Possibilities

By CURRAN POPE, M.D., Louisville, Kentucky

"WATER, water, everywhere," as Coleridge remarks through the mouth of his ancient mariner, is denied by none. Its use in medicine as a therapeutic measure, is, however, rare. Even in this day of growing appreciation of physical therapy measures you rarely meet an hydrologist; rarely hear of water's constant and persistent use in medicine. This seems all the more strange when we reflect that rarely do we find one single substance—water—so adaptable and so flexible that it can be employed in nearly all known diseases and disorders. Even in incurable diseases it may ameliorate and stay the progress of the pathologic state. It is practically never taught the student, and the practitioner learns so little about its action, its power and its use in disease that he does not realize its value. It is the *magnum bonum* of the physical therapist. To the

living man and woman, in health and disease, it is one of the most powerful means in all nature to preserve health, conserve energy and restore diseased tissue and function. It is the safest, best and one of the most effective cleansing agents used by moderns to cleanse the highways and byways, the alleys and the streets of the cities. It is the rainfall that cleanses the air, preserves the beautiful green of the grass, makes the land fruitful and crops plentiful. Water is cheap and costs less in municipalities than any other necessity demanded by the growing needs of the people of today. Its daily use is a preventative of disease, a sanitary measure of no small value, and it forms a definite and necessary part in the training of athletes.

Thermal Effects

Water is found universally; its temperature range varying from the vapor of

steam, to its crystalline state—ice—a range of some 150° to 165°F. It absorbs heat and cold rapidly, and in return rapidly loses its temperature content to the body with which it comes in contact, making it the agent best suited for the application of thermic changes to the external surface of the body.

Besides possessing a cleansing antiseptic action, water by its own weight, when under atmospheric pressure, enables the hydrologist to produce mechanical effects of widely varying degree, which, in their relationship to the body, are therapeutic measures for influencing the peripheral nerve terminations. It can be changed and varied in a precise and certain manner with ease and rapidity, so that the medical attendant has under his control, within a few seconds of time, a wide range of temperature, pressure, form of application and duration. It may be prescribed with the accuracy of a pharmaceutical prescription and its adaptability to the entire or to any portion of the human body is possessed by no other agent.

It may be stated roughly that water, so far as its temperature is concerned, falls into three zones: hot, neutral and cold. The characteristic of the so-called neutral zone is the suppression of all thermic stimuli, the cessation of cutaneous impressions, sedation, relaxation, and nerve rest. Results vary according to the manner of application, to its extent of surface, the duration of the treatment, temperature of the water, the mechanical effects produced at the time of its use, and such procedures as precede and follow it.

Above and below the neutral line—94° to 96°F.—the perturbations of the sensory nerve endings are conveyed to the central nervous system, giving rise to myriads of minute impressions, the registration of which, with their resultant reactions, may produce effects either general, local, reflex or transferred. Under these stimuli the system of the patient rallies to meet the changes, responds to its best ability to throw off or counteract their effect, and we then have those wonderful and intricate phenomena known as the hydriatic response.

In a number of experiments that I have conducted and am conducting I have found that the combination of hydrotherapy with light, or actino-therapy tends, when properly used, to produce the definite results

of each and yet supplement one another. It has been known for a number of years that the incandescent electric light cabinet is one of the best measures to prepare the patient for hydrologic applications and at the same time to enhance the patient's power to react to the tonic effect of cold water.

In a number of clinical studies made by me, I have found that certain effects, very promising but as yet not worked out in detail, may be obtained by combining a number of light therapies. For instance, there is no question but metabolism and increased fixation of the calcium content of the blood can be greatly enhanced by the use of even simple hydriatic measures within the reach of every home and every hospital in the land. The use of the quartz light, or of the highpowered arc lamp, with certain carbons cored to give a large percentage of ultraviolet rays, would much more quickly bring about a restoration of rachitic children to normal than will the present single or sole use of the quartz light. I can conceive of no better combination for such cases than that of ocean air, ultraviolet radiations and sea or surf bathing.

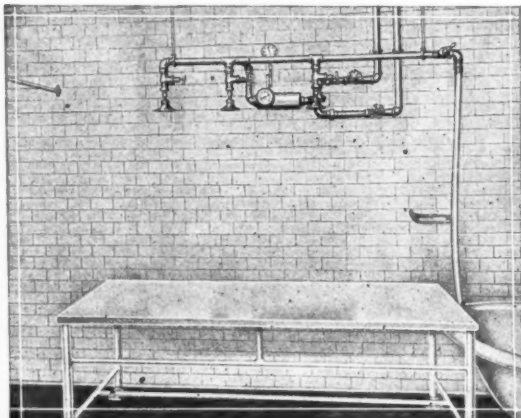
In cases where one wishes the metabolic influence, there is no more powerful combination than the incandescent lamp of high wattage (1500 C. P.), or so-called deep therapy lamp, with the various forms of tonic hydrotherapy. By *tonic hydrotherapy* I mean treatments that terminate in the use of cool or cold applications, usually under pressure, and which produce the so-called hydriatic reaction, without which the aim and object of the treatment would be defeated.

I have lately prepared a room in which I can command at will the quartz light, the arc light, with its many and varied cored carbons, the high wattage lamp and the large and powerful, deep infrared lamp. These are wired separately to this room so that they are independent of one another and therefore they are more or less constant in their action, and in this way physiologic effects may be obtained and studied under conditions that practically do not vary except in a minute way.

The Aix-la-Chapelle Douche

It has been known for a number of years that the manipulation or Aix-la-Chapelle or Aix-les-Bains douche was one of the most

satisfactory measures that could be employed in the treatment of vascular hypertension, organic and functional nervous diseases and many of the other diseases in the field of internal medicine. In this douche we have the combination of rubbing or massage, manipulation of portions of the body or the entire body and all the thermic and mechanical impression that may be obtained from the application of water at varying temperatures.



Aix-La-Chapelle Douche.

In the original bath of Aix-la-Chapelle, a hose is generally employed. This has impressed me always as being a most cumbersome and unrefined method of using this physical therapy measure. I have therefore devised a douche, by means of which one can regulate the pressure, temperature and other elements of the bath by means of certain showers, and at the same time leave the hands and arms of the attendant free for the purpose of massage or manipulation. It may be interesting to note at this point that it will sometimes give relief to a tabetic or to an individual suffering from multiple sclerosis when all other measures fail. Of this I shall have more to say in a subsequent article now in preparation.

The apparatus consists of three sprays that cover the entire body surface, the temperature of any one of which may be varied to suit the requirements of the individual case.

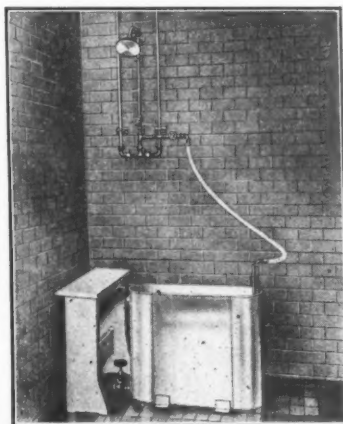
The Whirlpool Bath

To the majority of practitioners the whirlpool bath is an unknown entity—a much neglected method that does not de-

serve the innocuous desuetude into which it is permitted to fall. This bath is literally a bath of the extremities and is usually used as hot as can be borne by the patient. The limb immersed to the shoulder or hip in the tub is subjected to the agitation of the water produced by the action of indrawn air or by mechanical agitation, obtained by electric motor driven apparatus designed by Dr. Norman E. Titus of New York. I have heretofore dwelt very fully

with the physiologic and mechanical actions of this bath in a large number of diseases in the work of Dr. Fitch on "Mineral Waters of the United States and American Spas." In this bath we have the powerful influence of heat and the agitation of hot water in a more or less spiral column. Its influence is that of a powerful relaxant, a marked sedative and a stimulant to the cutaneous surface and tissues that are immersed in the water.

I have been one of the longest and most persistent users of this bath and believe that it has one of the greatest futures in neurology, in diseases involving the extremities and in industrial surgery. I have also proven to my own satisfaction that these agitators, or aerators, when properly applied, offer a far better and much cheaper method in treating heart diseases than does the Nauheim bath. I have employed the Nauheim bath for many years



Whirlpool Bath.

and, as its physiologic and mechanical action upon heart action and heart muscle is so definitely recognized, I shall not dwell upon this feature but merely state that I consider the whirlpools, mechanically produced by the means above mentioned, to be an excellent substitute for the chemical means used in the Nauheim bath. I first mentioned this fact some three years ago and I see no reason to change my opinion of its value. It is well known that these methods will, in a weakened and dilated heart, reduce its volume or size, reduce the number of beats, increase their volume, increase the urinary output and flow, and increase elimination. It therefore has a wide field in cardiac dilatation, cardiomyasthenia, (a name I have coined for a weak heart), neuro-circulatory-asthenia, irritable heart, exophthalmic goitre, hypothyroid heart, vascular hypotension, and is helpful in all forms of spinal sclerosis.

Electric Baths

The use of the full bath, with the sinusoidal, galvanic and Faradic currents, is a much neglected field. This bath should be given in a tub with the patient's body immersed, with the exception of the head and neck. Its action is principally upon the neural and muscular systems, and is reconstructive. If warm it relaxes, if neutral is sedative and is tonic if cool. In this bath we have a valuable ally for the treatment of vascular hypotension and in its effects it may be likened to the "General Galvanization," and "General Faradization" (when these currents are used) so thoroughly and completely described and worked out by two American physicians, my teachers in this line of work. Drs. Beard and Rockwell, two of America's most wonderful physical therapists of forty years ago.

In the use of the sinusoidal current we have a measure that greatly resembles gen-

eral faradization, except that the motor results are more evenly obtained, the sensory sensations more pleasant and possibly the penetration greater. In this bath we have a wide application in functional, nutritional and organic diseases of the nervous system and in those cases where we are desirous of increasing the general functional activity of the patient.

In conclusion it might be said with truth that it is a shame and pity that such effective methods are not more employed. I cannot but feel constrained to believe that the apathy of the medical profession is directly the result of a lack of knowledge of how to use these hydro-electric measures.

May we not say in all truth that colleges and universities of medicine, speaking generally and not in particular, are criminally responsible for not teaching these facts to students? This teaching should not, from my practical experience, be taught by an all-time or part-time professor, whose sole knowledge is that gleaned from the pages of others, but by an experienced man who will not only teach his classes but demonstrate the action of these agencies upon the human body.

The incurable can not be cured. The definition of "The Incurable," is oftentimes based only on hygienic, dietetic and chemical (drug) methods. What may be incurable under those circumstances may become curable under a rational combination of all measures.

It is interesting to note that hydro-therapy does not interfere with hygiene, personal sanitation, diet, rest, exercise, occupational therapy, chemicals (drugs) or any other physical measures, provided the hydriatist is a past-grandmaster in his art.

115 W. Chestnut St.

Radiothermy; Its Production and Employment

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Radiothermy Defined

THERAPEUTICS is the art of producing predetermined reactions in the human body, whereby it is assisted to restore itself to normal function and structure. The minimum object of therapeutics is the prolongation of life.

These reactions are initiated by the application of suitably selected forms of energy with appropriate technic according to well-defined indications. Energy is exhibited in two forms—potential and kinetic.

Potential energy is employed as ventilation, diet, drugs, chemicals and biologicals. Kinetic energy is employed as heat and cold, electrolysis, kataphoresis, electromagnetism, electromagnetic radiations and motion.

Heat may be generated deeply within the tissues of the living human body by the absorption of penetrating electromagnetic waves of the ether, generated by heated bodies. As this is just as truly converse heat as that created by high frequency electricity, called diathermy, I have thought it well to speak of the use of converse heat from radiant sources as *radiothermy*. Again, its effects, indications and contraindications are, within certain limitations, entirely analogous to those of diathermy.

Caloric Rays and Caloradiance

We owe to Langley the discovery of these rays for which he was compelled to invent the bolometer. They lie between 250 millimicrons and 55,000 millimicrons (55 microns) in the spectrum, with a maximum caloradiant energy at 650 millimicrons, which is in the visible red region, while the great preponderance lies in the ultrared (or infrared) region, extending to about twenty times the extent of the visible portion. The wave length limits of greatest value for radiothermy lie between 600 millimicrons (visible orange) and 2,000 millimicrons, in the invisible ultrared region.

Because of the confusion, misapplication and vagueness pervading the literature of radiation and radiation therapy, the Committee on Phototherapy, of the American Electrotherapeutic Association, recommended the use of the terms caloric rays

and caloradiance in its report of 1925, to replace such terms as light rays, infrared rays, light and heat rays and heat rays, artificial light, light bath, electric bakes, dry heat, etc., and to specifically distinguish them from rays having other physical and physiologic properties. These rays are not heat, because they are disturbances of the ether while heat is disturbances of molecules. The fact that a moiety of the radiation happens to be also visible is purely an accident of the generation which is of little or no demonstrable therapeutic importance. The use of an opaque diatherminous filter will prove this.

The Production of Caloric Rays

When a substance is heated it gives off electrons which increase in number and velocity as the temperature rises (vide the Coolidge hot cathode filament). The accelerated motion of liberated electrons produces electromagnetic waves of the ether. As their velocity and number increase, shorter wave lengths are added until we may have lengths and even ultraviolet rays produced. The total radiation of a heated body is, therefore, a mixture of all the wave lengths emitted by that body.

For every degree of temperature rise there is one wave length which will exceed in energetic quantity any other wave length in the rest of the spectrum and this shifts from the ultrared into the visible as the temperature rises. It is also true that the higher the temperature the greater the emission in the ultrared portion. Incandescent bodies give off more radiant energy than hot black bodies at a temperature just below the glowing point, and these, more than bodies at the boiling point, and so on.

The Sources of Caloric Rays

These are the direct and reflected rays from the sun, carbon arcs, incandescent filaments and rods and hot black bodies.

(a) The solar rays reach the surface of the earth after filtration through the atmosphere, delivering the equivalent of 1.7 horsepower per square yard or 1.47 kilowatts per square meter, at meridian,

at sea level and in the tropics. The Smithsonian Institute determined it to be 7,000 horsepower per acre, or 0.16 horsepower per square foot—an equivalent of about 35 calories per square foot per second.

Roget estimated that 0.6 percent of the energy reaching our atmosphere is lost at the altitude of Mont Blanc—4,810 meters; eleven percent at 3,000 meters; twenty-one percent at 1,200 meters; and thirty-two percent at sea level. Of the remaining radiation, eighty percent was found by Langley to be in the ultrared, nineteen percent in the visible and one percent in the ultraviolet regions.

The limits of the solar spectrum at sea level are 289.6 millimicrons in the ultraviolet and five microns in the ultrared, although Bachem says traces of 18 microns have been detected. Ordinary glass filters out wave lengths smaller than 310 millimicrons. For our present purpose, solar rays filtered through glass, as in the so-called sun parlors and in plant greenhouses, retain only the caloric and visible rays.

(b) The rays from electric arcs with carbon electrodes have been found to be the closest approach to solar rays of any artificial source examined by the Bureau of Standards of The Department of Commerce of the National Government. These rays may be altered in quality by using carbon electrodes impregnated with substances which give characteristic spectra in the ultraviolet portion of the spectrum when the arc operates.

There are many types of lamps, from marine and antiaircraft search lights down to the small lamps used for amateur photography. The electrodes may be in the same axis or converge from an angle or be parallel. The arc may be naked or enclosed in a hermetic quartz chamber.

(c) Incandescent filament lamps are of two types: the carbon and the tungsten. For our purpose, the carbon filament is preferable and various sizes are gauged as to wattage from 25 up to 375 watts. Any larger wattage would not be economical, as its heat would necessitate irradiation at a great distance. The smaller lamps are used in radiant bath cabinets. The tungsten does not give the same degree of radiation because it does not heat up to the same temperature as the carbon with the same voltage, as the tungsten does not offer the same resistance. For this reason tungsten

lamps have to be made proportionately larger to obtain the same therapeutic effect in the same time.

The so-called deep-therapy lamps are very imposing, with their 1500 watt bulbs and ample reflectors, but they are highly wasteful of both current and radiant energy as they must be applied longer to obtain the same effect as that from a much smaller carbon filament lamp, and they cannot be approached near to the patient, therefore a great deal of the radiated energy never reaches the patient and is wasted in space.

These lamps have an ultraviolet limit of 310 millimicrons, owing to the filtration of the glass globe, while the carbon filament lamps have a limit somewhere in the green-yellow, at about 500 millimicrons; but the carbon filaments give off ultrared radiations well down in the limit of that portion of the spectrum. All things considered, the carbon filament with 260 watt energy and the radiant cabinet with 40-watt, carbon filament lamps are the most economical for the therapeutic effect.

(d) Incandescent and glowing mineral rods and grills and incandescent metallic spirals with reflectors, either the so-called "electric heaters" or the recent therapeutic radiators, called variously biolite, zoalite, etc., operate at about 660 watts; and, while therapeutically efficient as generators of caloric rays, are not so economical of current as are the carbon filament lamps.

(e) Black, hot bodies at a temperature short of glowing are the least effective source of caloric rays but may be made use of in an emergency, as a flat-iron, held as near as can be borne to the treatment area. The electrically heated iron will maintain an equal temperature and caloric output as long as the current is on. The radiation is entirely in the ultrared region.

The radiation from hot water bottles, rubber coils, poultices, etc. is too feeble to be included in this discussion. These agents are employed for conductive heat—an entirely different physical agent and producing very different physiologic reactions.

The Physiologic Effects of Radiotherapy

The caloric rays penetrate living tissues directly as the wave length. When energy is converted into heat we say it is absorbed, and absorption of some wave lengths takes place at every level, down to the extinction of the longest wave length at the greatest depth. At what depth the maximum conversion takes place varies with the dia-

thermancy of the structures. While measurements might be made with instruments, we find that the clinical response of a deep-seated tissue to the rays is sufficient evidence of their penetration.

The physiologic effects are the immediate and the resultant effects from the reaction of the reflexes to heat. They are, therefore, focal or local or systemic, depending upon the technic employed.

(a) *The focal and local reaction to heat is neurovascular, with dilatation, causing an active hyperemia. Fresh blood in abundance helps to maintain the tissues at a viable temperature. It is also restorative, containing nutrition, vitamins, auto-coids, oxygen, water, phagocytes and natural immunizing bodies, salts and enzymes. The vascular dilatation creates tissue drainage and relieves the cells of the accumulations of their own excretions and activities, as well as of phagocytes gorged with bacteria and organic detritus. Exudates, extravasations, infiltrates and clots when not yet organized into fibrous tissue are therefore washed out and fluids are absorbed into the blood stream.*

Relief of stasis and its concomitant tissue asphyxia reduces the acidity, thus restoring the normal hydrogen ion concentration of the tissues.

The effect upon the skin, in addition to those just mentioned, is a marked increase in functional activity. The sweat and sebaceous glands excrete profusely. The erythema is immediate, not delayed as with ultraviolet or x-ray, and subsides more or less rapidly after cessation of the irradiation. When properly administered there is no desquamation nor blistering, therefore there is no visceral reaction, as occurs with ultraviolet, no sunburn results and no pigment with tanning ensues.

Secretions are promptly increased so that catarrhal accumulations are rapidly liquified and discharged through their natural channels.

The relief of pain, especially that due to nerve inflammation or nerve pressure from exudates, is most gratifying.

With relief of pain and swelling, motility returns to muscles and joints and function to embarrassed organs.

The rays are not harmful to any of the tissues, not even the eyes, which may be irradiated with perfect safety through the closed lids for indefinite periods.

The bactericidal effect is obtained through the advent of antibodies and phagocytes in the blood stream; also some bacteria, as the gonococcus, are destroyed or weakened by a temperature well above normal but below that which is lethal to body cells. This is possibly the most valuable attribute of radiothermy.

(b) *The systemic effects of radiothermy.* If a portion of the body be subjected to irradiation long enough the entire blood stream will become raised in temperature, but the systemic reaction is best obtained by exposing the major portion of the nude body to caloric rays from a concentrated source of radiation, as in the radiant bath or the glass-enclosed sunparlor.

The rise in body temperature is accompanied by increased basal metabolism. Carbon dioxide exhalation increases from one to four percent (in a Turkish bath, an increase to eleven percent has been noted). The respiration rate increases but the tidal air is decreased. Volatile gases and odors are given off in appreciable quantity.

The perspiration in the radiant bath is due to the converse heat of the rays and not to the convective heat of the air in the cabinet. Cool air may be admitted freely and open air currents are beneficial in solar radiothermy. The amount of perspiration in a radiant bath whose air temperature is 81°F. is about twice that in a Turkish bath having an air temperature between 140° and 148°F. and is by no means so exhausting. If, however, the temperature of the air in the cabinet be increased by closing the ventilators, the evaporation from the skin will cease, the patient will be unable to cool himself and his temperature will rise. If in addition he be given hot drinks he may be made to perspire a quart in about twenty minutes. This however is followed by some prostration and lassitude which, in the debilitated and elderly, may be quite serious. The temperature will be found to be raised four or more degrees in the rectum—a veritable state of fever.

Tobacco and alcohol; substances resulting from intestinal absorption and sub-oxidized amines and toxins; the esters from diabetes; sulphur, mercury, lead and other chemicals, the result of occupational absorption, will appear in the perspiration. The elimination, in the toxemias, is rapid and gratifying. Continued excessive elimination dehydrates the blood, causing a de-

crease in volume with consequent irregular pulse and a sense of fainting, which may be prevented by drinking water freely while in the bath.

There is at first a sense of throbbing in the head, due to an initial rise in cardiovascular pressure. Likewise the temperature of the brain rises. This must be counteracted by a turban of cold, wet towelling or a capshaped Leiter's coil.

The general vasodilation causes a fall in cardiovascular pressure which tends to reduce the work of the heart and decongest the viscera by diversion of the blood into cutaneous and splanchnic paths. Too long an administration leads to lassitude, syncope, nausea and vomiting with subsequent prostration, especially if the treatment be given in the sitting posture. With debilitated, senile or cardiac patients this may prove serious.

The decreased vascular pressure and the reduction in volume of the blood reduces the renal excretion in quantity.

Appetite, digestion and weight are markedly affected, due to the increased splanchnic blood supply. Intestinal stasis is benefited, digestion is improved and appetite induces increased eating. This must be guarded against with those inclined to stoutness and the obese. By the eliminative treatment, plus judicious exercise and a restricted regimen, however, weight may be reduced. Too rapid a reduction is dangerous as it will throw an extra burden upon the kidneys, consisting of partially oxidized products of fat combustion.

The initial symptoms in the brain are a throbbing with sense of fullness and vertigo which, however, passes away, being replaced by a feeling of mental clearness on which drowsiness supervenes. The sympathetic nervous system is greatly soothed, as there is a marked reduction in irritability. The spinal nerves are likewise quieted, pain is almost always allayed and muscular cramps are relieved. Applied over the abdomen it makes a good hypnotic.

Even short exposures to caloric rays in radiant baths produce marked changes in the blood. It becomes more alkaline. There is a reduction in its total content of carbon dioxide and a slight increase in alkali reserve. This is undoubtedly due to the loss of CO_2 by lungs and skin, favored by the more ready exchange between tissues and blood, from the hyperemia. The oxygen

saturation of the peripheral blood rises. Blood sugar falls.

Mice, rats and guinea pigs, subjected to a brief exposure to caloric rays, showed a sharp fall in the white cell count, from which the leukocytes made a very slow recovery of some weeks while the lymphocytes rapidly increased until, at the end of two or three weeks, a gain of 200 to 300 percent above normal was attained. Many showed amitotic division. This fact was found to be of great importance in increasing the resistance to spontaneous and inoculated cancer and to large amounts of inoculated bovine bacilli.

The caloric rays have the property of neutralizing the cutaneous reaction to ultraviolet and x-rays. They will relieve the pain of a sunburn, for example, and will check an x-ray erythema even after it has appeared. When mixed with ultraviolet, as in the rays from carbon arcs, it is quite difficult to obtain tanning and impossible to obtain a typical sunburn. Special electrodes are required to produce ultraviolet erythema, or resort must be made to skin sensitization by salt water applications or eosin and other fluorescent drugs internally. This is of no practical advantage. The sunburn of altitudes and the temperate zone is rarely seen in the valleys or in the tropics.

Skin eruptions of an infectious character do well under caloric rays. Pustulation is reduced and scarring is minimized. This explains the empiric use of red lamps and red hangings and red ointments for smallpox; not because red is advantageous, but because exclusion of or absence of ultraviolet irritant rays prevents cutaneous irritation.

The caloric rays alone seem to have no effect upon the vitamin utilization by the body. No changes are wrought in the calcium and phosphorus content of the blood nor upon bone growth and lime conversion. Plants, animals and the young of human beings do not thrive under caloric radiation alone, as has been abundantly proven. Radiotherapy has, therefore, a very definite place in nature as an adjuvant to ultraviolet radiation, to produce the necessary supply of calories for the initiation of physiologic processes. It will not sustain life in its fullest vitality.

Overexposure to caloric rays produces the well known heatstroke and sunstroke,

the symptoms of which need not be repeated here.

The Indications for Radiotherapy

These may be divided into preventive, remedial and adjuvant and will vary slightly in focal and local applications from systemic applications.

(a) *Focal and local radiotherapy.*

1.—*Preventive indications.* Local radiotherapy should be employed as a routine measure to prevent the complications of the acute exanthemata: Therefore, in measles, radiotherapy of the chest will prevent bronchopneumonia and empyema; of the ears will prevent otitis media and mastoiditis; of the face will prevent sinusitis. In scarlet fever, radiotherapy of the kidneys is indicated to prevent nephritis. It will prevent parotitis from becoming epididymitis by raying the testicles. It reduces the spasms of whooping cough, bronchitis and asthma and prevents the exhaustion entailed by the paroxysms of non-productive coughing. It will relieve the passive congestion of the lungs in decompensated heart lesions. When used with x-rays it will check or ameliorate a possible erythema, as pointed out by Snow. It will prevent scarring of burns, wounds and plastic operations.

Wherever the focus of focal infection is discoverable, the radiothermic treatment of that focus is indicated, provided free drainage is obtainable.

It is indicated in threatened gangrene from impaired local circulation, as in angio-neurotic edema, Raynaud's disease, diabetes, phlebitis, trench foot and contusions, to prevent gangrene or abscess formation.

It is very valuable in all inflammations of motor nerves and their ganglia, preventing paralysis and, when used over the affected muscles, will prevent fibrillation and wasting.

In acute inflammations of tendons and joints it will prevent adhesions, with the consequent deformity, and when used early, before organization of the exudate has occurred, it will prevent the ankylosis that so often follows dislocations, sprains and inflammations of joints.

2.—*Remedial indications.* Radiotherapy should be used for infection wherever present, except where pus is walled in by circumscribing tissues. Thus all natural cavities with natural drainage openings will

drain their pus through these channels without surgical intervention unless polypi or some foreign body blocks the outlet, and incised abscesses or those draining through fistulas will resolve.

For these reasons, acute catarrhal or purulent inflammation of the various sinuses, of the middle ear and mastoid, of gall bladder, kidneys, uterus, salpinges, prostate, seminal vesicles and urinary bladder are all markedly benefited and often curable without other treatment, thus avoiding mutilating and often dangerous surgical measures. No case of catarrhal rhinitis should ever be allowed to cause a sinusitis or an otitis media, and no otitis media should ever be allowed to become a mastoiditis when this simple remedy is available.

The ordinary head cold or the influenzal coryza are frequently cured in less than an hour's treatment. Laryngitis, tonsillitis, noma and thrush are all benefited, though the addition of ultraviolet rays, especially in diphtheria, is highly advisable, to obtain a greater germicidal effect upon the surface-lying germs.

Pneumonia, bronchopneumonia, bronchitis, whooping cough and asthma are all improved and the cough allayed.

It is healing in boils, carbuncles, pimples, acne, infected wounds, ulcers and granulation tissue and aids in wound repair. It lessens subsequent scarring and is very soothing as a postoperative application to surgical incisions.

It is a specific in gonorrheal ophthalmia and iridokeratitis and is a life saver in cellulitis with ascending lymphangitis and osteomyelitis. It promptly heals erysipelas. It may be used for acute urethritis, for pelvic and vaginal infections of women and for prostatitis, vesiculitis and epididymitis in the male. It is excellent to prevent the chill after cystoscopy and catheterization.

It will reduce the swelling of acute sprains, contusions, exudates and of phlebitis and adenitis.

It relieves the itching of eczema and urticaria and is a wonderful application for sunburn and caustic burns, obviating all other tormenting dressings and relieving pain to the extent of obviating anodynes. The burn heals rapidly with a minimum of scarring, the scar being very pliable and not distorting. Septic absorption from the burn is likewise checked.

It takes the place of antispasmodics and

other procedures in intestinal and uterine colic and muscular cramps and spasms.

3.—*Adjuvant indications.* It should be used as a routine postoperative measure to hasten repair and allay pain; and as a pre-operative measure to reduce infection and insure a good supply of blood to vitalize the operative field. Should the surgeon object that bleeding will be augmented, he is referred to the use of the endothermy knife causing bloodless incisions and sterile wounds. It hastens fracture union.

Applications to the feet and legs or the abdomen will draw the blood away from the brain and relieve congestive headaches and threatened apoplexy, and should hemorrhage have occurred it will lessen the pressure in the cerebral vessels. The same may be said for pulmonary and gastric hemorrhage.

4.—*Contraindications* to local radiotherapy. It is never used for imprisoned pus, for cysts, tumors, thrombi or emboli, over organs where hemorrhage is threatened, as gastric and intestinal ulcers, tuberculous processes of the viscera, the head in apoplexy or the uterus in metrorrhagia.

(b) *Systemic radiotherapy.*

1.—*Preventive indications.* It is used as a preventive of complications in the acute exanthems, as a detoxicant in threatened toxic comas, as a vascular dilator in threatened apoplexy, to prevent pneumonia after ether, gas, smoke, water or food inhalation, as soon as the patient is conscious, in cases of shock from exposure, freezing and exhaustion and the shock of severe injuries to restore the normal temperature and conserve the vital spark while other measures are being taken.

2.—*Remedial measures.* It is often a life saver in occupational, drug and septic infections and the toxemias from intestinal and faulty renal excretion (the fever will abate, the pulse soften, the delirium or coma will clear), lowered nutrition from decreased basal metabolism, endocrine imbalance, acidosis, conditions of suboxidation, as obesity, gout, diabetes, etc., respiratory inflammations and congestions, endocarditis, enteritis, mucous colitis, pelvic infections, nephritis; in acute fevers and high blood pressure, in emotional or maniacal conditions, insomnia and delirium.

It is valuable in the acute intestinal indigestion of infants, relieving the colic and convulsions, and will help reduce gas.

3.—*Adjuvant measures.* As a calmativ

after operations and to relieve shock, but only when there is no danger of hemorrhage; as a preoperative treatment to reduce toxemia, relieve the kidneys, reduce acidosis and improve autogenous antitoxins; as a preliminary to contrast hydrotherapy for neurovascular training and in conjunction with exercise and diet in cases of obesity, malnutrition, neurasthenia, melancholia from autointoxication.

It should be employed in cases of cachexia from malignancy because of the lymphocytosis which is an active agent against malignancy and to eliminate the products of tumor decomposition after x-radiation and gamma radiation. Finally, as a general stimulant to metabolism and nutrition, to relieve an embarrassed and laboring heart.

4.—*Contraindications* to systemic radiotherapy. All those mentioned for local radiotherapy. It is never employed directly after a meal during active gastric digestion. It is used with great caution for elderly, asthenic, youthful, insane or nervous persons, beginning with short initial periods and gradually lengthening. Long exposures are always productive of harm. It is valueless in diseases due to malassimilation of calcium and phosphorus, as rickets, tetany, hyperchlorhydria, osteomalacia, purpura, etc., tuberculosis and chronic skin diseases with keratosis, etc. (Here ultraviolet rays are remedial or adjuvant). Alone, it is not of benefit to growth and development but must be combined with ultraviolet rays. Its indiscriminate use in bath establishments, reducing parlors and so-called physiotherapy institutes, run for commercial reasons by non-medical proprietors, is highly dangerous and to be condemned. It must not be used in cases of acute heat stroke or sunstroke nor in cases where there is a history of such an attack in the past, except with the greatest of caution.

The Estimation of Dosage With Radiotherapy

Dosage is a given amount of energy to produce a definite amount of reaction. The factors in radiotherapy dosage are: *quantity*, emitted at the generator and estimated in watts (with artificial generators) and depends upon the temperature. Wattage being equal, the element with the greater resistance will have the higher temperature and will emit the greater

amount of radiant energy; *time*, a generator of a large quantity used for a short time will give the equivalent in calories of a generator of small quantity used for a long time; *intensity*, the size of the area irradiated directly affects the reaction, while the reaction is affected inversely as the square of the distance between generator and treatment area. For this reason the close application of a weak generator may produce a reaction equal to the use of a powerful radiator but at a greater distance. This permits the use of low wattage lamps with equal therapeutic effect to the so-called deep-therapy lamps of 1500 watts. The use of the latter is wasteful both of current and of radiant energy since they cannot be brought near to the patient and every ray not falling on the part to be treated is wasted. The employment of parabolic reflectors makes use of rays which would otherwise be lost and adds them to the direct radiation. Employing reflectors which bring the rays to a focus or the use of convex lenses or the too close approach of the generator will cause a severe burn and may also set fire to clothing or furniture. Such might be used to cauterize a mole, wart, ulcer, tubercle, cancer or sloughing wound. This might usher in the technic of surgical radiotherapy which as yet has not appeared in literature.

Reaction is local or systemic, according to the technic. In either case it is directly subject to skin tolerance. The rule being to place the generator as near the bare skin of the patient as is comfortably tolerable. As the patient grows accustomed and the skin capillaries become engorged the distance may be lessened. With the unconscious, the stupid, the foreigner, the infant and where treating a burned or ulcerated surface, the physician or nurse places the hand on the part, with the back of the hand receiving the rays intended for the patient, as a guide to tolerance. The local reaction desired is destruction of the infection, liquefaction and discharge of pus, resolution and healing by granulation, and relief of pain. The irradiation should therefore be continuous throughout the twenty-four hours until the result is obtained. The habits of irradiating for an hour and intermitting for an hour and so or of omitting all irradiation during the night or of giving an office treatment of an hour daily, have nothing in clinical exper-

ience or therapeutic indication to recommend them. The irradiation must be continuous until the maximum result has been obtained. Patients rest very well and sleep soundly even with full irradiation of ophthalmia.

The systemic reaction will depend upon whether a subsequent hydrotherapy treatment is to be used, when only enough irradiation is given to bring a perspiration to the skin; or whether elimination is indicated, in which case the condition of the patient and the physician's own judgment must guide as to the length of time necessary.

Whether solar rays filtered through glass or the cabinet bath with carbon filament lamps is indicated will also be a matter of judgment. The latter is much more prompt and decided.

The employment of tungsten lamps in the cabinet bath is wasteful of current and requires a longer exposure to obtain the same result obtained with carbon filaments. Again, one does not need an expensive metal cabinet. Lamp sockets (eight or ten) strung along a wire and festooned over a bed cradle will give satisfactory results. Radiation may be controlled by turning on or off any number of the lamps. A sheet thrown over will give satisfactory seclusion and reflection and the ends are raised to allow of through and through ventilation. The entire treatment outlined in this paper may be attained with an expenditure under twenty-five dollars.

Systemic treatments are for a definite period and may be repeated daily or every other day according to the urgency of the case. A reclining posture is preferable to a sitting posture. A gentle ablution with tepid water and a rest upon a couch are good post-treatment measures.

Carbon arcs may be employed for radiotherapy where the rays do not cause an ultraviolet erythema which would shorten the treatment and interfere with the intended result. The addition of ultraviolet rays is a very good adjuvant to our treatment, giving a tonic ingredient. The so-called prescription carbons should not be used but only those which will permit of thirty minutes irradiation without sunburn.

One other and final precaution: Never use any but clear, transparent bulbs for the lamps. The use of colored or frosted

globes reduces the amount of radiant heat and increases the heating of the air, which is both wasteful and ineffectual.

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47 W. 52nd St.

Surgical Diathermy in Malignant Vesical Tumors

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THE poor results following resection of malignant vesical tumors by the knife lead to a certain nihilism. Quite a few experienced surgeons have expressed the conviction that such patients are better off without any surgical intervention. This attitude materially changed with the introduction of electrocoagulation into the therapy of such conditions.

The reasons for this are of a technical and clinical nature.

Resection by the knife is always an extremely bloody and difficult job, and in most instances a thorough eradication cannot be accomplished.

The electrocoagulation, after once the bladder is opened and the tumor or tumors are exposed, permits an orderly procedure and the operator is not embarrassed by hemorrhage.

Resection, in the best hands, produces a very high primary mortality; and even if the operation is technically successful, the unavoidable reduction of the vesical capacity causes the patient considerable discomfort.

Recurrences after resection are the rule and are subjectively perceived as more torturing than the primary tumefaction.

Electrocoagulation shows a primary mortality of not more than ten percent, and all the operators experienced in both methods assert that the definite results are far superior to those accomplished by the knife.

Even in cases that do not permit a definite cure, electrocoagulation furnishes palliative relief extending over a considerable period of time.

As in other malignant neoplasms, surg-

ical diathermy seems to possess a rather specifically curative influence on vesical tumors. Though in a great many instances, on account of the extensive infiltration, it is impossible to destroy the tumor in its entirety, even in such cases remote results were to be noted. The explanation of this fact may be sought in the creation of the so-called perithermic zone. Around the coagulation there is always to be found an area of pronounced reaction. In this area, shortly following the coagulation, there are to be found numerous round cells, leukocytes and fibroblasts of recent origin. That these cells are highly vitalized and energized is indicated by their prompt acceptance of intravital stain.

It is suggested that during this time of reaction radiotherapy ought to be employed, to take advantage of the increased susceptibility of these activated cells.

It may be suggested that the raying enhances the capability of these cells to produce materials, which upon entering the circulation stimulate the endocrine organs to produce regulating and defensive ferments, reducing the malignant cells to the level of normal activity.

In fact there are cases on record in which the combination of diathermy and radio-

therapy lead to complete restitution of normal tissue at the site of the tumor, without any cicatrization—a true metaplasia.

Technic

The technic does not differ from that of any other cystotomy performed in order to gain free access to the interior of the bladder.

In case the tumor is located in the *bas fond* of the bladder, an assistant places two fingers in the rectum or in the vagina of the patient, and exerts upward pressure. Thus not only the bottom of the bladder is raised and becomes more accessible but the assistant is in a position to warn the operator, if the perception of heat in the inserted fingertips tells that the danger line of coagulation has been approached.

In this way immediate perforation or perforation by sloughing will be avoided.

Cystotomy and coagulation may be performed under sacral anesthesia and local infiltration of the abdominal wall, with absolute absence of pain.

It may be safely stated that, at the present time, electrocoagulation ought to be the method of choice in dealing with malignant tumors of the urinary bladder.

108 N. State St.

Surgical Diathermy in Hemorrhoids

By J. DOUGLAS MORGAN, B.A., M.D., Philadelphia, Pa.

THE electrothermic methods (surgical diathermy) make use of the high-frequency currents. A high frequency current is one that periodically reverses the direction of its flow at an exceedingly high rate. The voltage from the alternating current supply mains is raised by means of a step-up transformer and the current is passed into two Leyden jars (condensers) whose inner coats thus become charged, producing, by induction, equal and opposite charges on the outer coatings. (Fig. 1).

When the electric pressure becomes sufficiently great to break down the resistance of the air, a torrent of sparks darts across the spark gap. Thus the charges on the inner coats become neutralized, and, simultaneously, those on the outer coats of the Leyden jars, and a current passes along a solenoid connecting these. Each spark appears to be single, but in reality it consists of a series of sparks, each one being

smaller than that which preceded it until, the charges on each side of the jars being neutralized, the sparking comes to an end. The rate at which the Leyden jars are charged is perhaps a few thousand times a minute; whereas the oscillations in the solenoid, following each discharge, may number several millions per second.

Oudin, in 1892, found that, by causing the high-frequency current to pass through a limited number of loops in the solenoid, he obtained "resonance" effects in the remaining loops; that is, he obtained from the free end of the solenoid (resonator) a high-frequency current of enormously increased voltage, vibrating in sympathy with the high-frequency, lower-potential current in the first few loops (Fig. 2). This is sometimes called an Oudin current, and is referred to (loosely) as monopolar, since only one electrode (the active) is required.

By placing a secondary coil of wire in

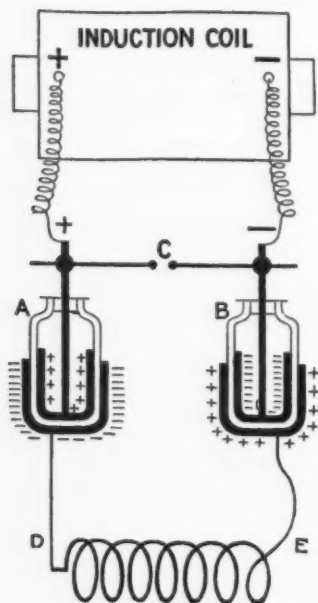


Fig. 1*.

close proximity to the solenoid, a high-frequency, induced current is obtained from the extremities of the coil. This is sometimes called a Tesla coil, but the current obtained is more frequently referred to (clinically) as a d'Arsonval current, as d'Arsonval was the first to point out its value in the treatment of certain pathologic conditions. It is also known as a bipolar current, because two electrodes (active and indifferent) are required. This current is of lower voltage but higher amperage than is the monopolar current.

When a current flows through a conductor (whether a wire or the body tissues), energy is absorbed in overcoming the resistance and the conductor becomes heated. The rising of the temperature of the tissues lying between the electrodes of a high-frequency apparatus is known as "diathermy," because the heat passes through the depths of the tissues; or as "endothermy," because it is generated within the tissues and does not come from without. When the heat is sufficient to produce physiologic effects only, it is known as medical diathermy; but when sufficient to produce destructive effects it is known as surgical diathermy. In order to dis-

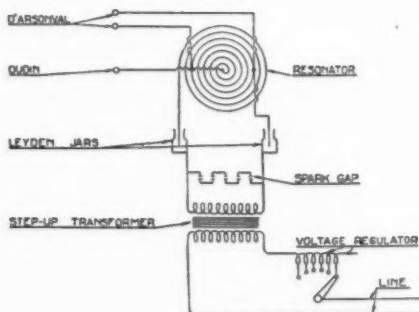


Fig. 2*.

tinguish more clearly the two, the latter is sometimes called endothermy, limiting diathermy to the production of physiologic effects.

It is intended that endothermy, meaning "heat within," shall distinctly differentiate the method from all others employing surface application of heat, such as the actual cautery, the electrocautery, the Paquelin cautery, etc. Even "fulguration," although the product of the high-frequency current, is only another form of applying surface heat.

Electrocoagulation and Electrodesiccation

There are two methods of applying endothermy; namely, electrodesiccation and electrocoagulation.

Electrodesiccation (originated by Clark) consists in the use of a monopolar current of moderate strength, applied by means of a sharp needle-electrode. The point of the needle is placed in contact with the surface of the tissue to be destroyed, or inserted to whatever depth is necessary. The resulting effect will depend on the strength of the current used, the depth to which the needle is inserted, and the length of the application. The result is the production in the tissues themselves (the needle remaining cold) of just sufficient heat to drive off the water in the tissue cells. Since the mode of cell death is thus associated with very little degenerative change and scant disintegrated material, there is but a small amount of fibrous tissue as an end result. This method is particularly advantageous in the treatment of hemorrhoids.

Electrocoagulation (originated by Doyen) employs the bipolar current. One electrode (the indifferent) consists of a well-moistened pad or a sheet of heavy lead-foil, applied firmly to the body of the patient;

*From Morgan, "Electrothermic Methods in Neoplastic Diseases," published by F. A. Davis Company.

the other (the active) is the needle-electrode. A greater degree of cell destruction results from this method and a proportionately greater amount of fibrous tissue will be present in the resulting scar. The coagulation method can be made very destructive.

The advantages of the electrothermic methods in the treatment of hemorrhoids are the following: No general anaesthetic is necessary; there is very little inflammatory reaction and practically no post-operative discomfort, nor contracted scar formation; the operation may be done in the doctor's office, and in many instances the patient is able to go about his business immediately afterwards. However, in cases where the removal of internal piles has necessitated complete relaxation of the sphincter muscle, it is advisable for the patient to remain in the recumbent position for several hours before leaving the office; and after extensive removal of hemorrhoids to retire to bed, on reaching home, for 24 to 48 hours.

Preparation and Anesthesia

The patient is instructed to partake of nothing but liquid food and is prepared by giving a purgative on the day preceeding the operation, followed by an enema (2 drams of sodium bicarbonate in a quart of lukewarm water) in the evening. The enema must be repeated the following day a few hours before the operation. In the case of a nervous patient, or when numerous hemorrhoids must be destroyed, administer a hypodermic of $\frac{1}{4}$ grain morphine sulphate, combined with 1/150 grain of atropine, an hour before the operation.

The operation may be done with the patient in the lithotomy position, or (perhaps preferably) in the left Sims position, in which he will be more comfortable and, by pulling up the right buttock himself, may materially assist in exposing the anus.

Thoroughly cleanse the part with water and liquid soap, and dry it. The skin surface is then painted with 2-percent mercurchrome solution.

At a point $\frac{1}{2}$ inch posterior to the posterior commissure of the anus, insert the hypodermic needle at right angles to the skin surface and slowly inject the anesthetic solution under the skin until a wheal about one inch in diameter has been formed. The solution may consist of 2-per-

cent novocain (procaine), to which has been added about 3 minims of adrenalin (epinephrin) to the ounce of solution. Slightly withdraw the needle and change its direction so that it will pass first along one side of the anus, and then along the other, injecting some of the solution from time to time, until a semilunar wheal has been formed around the posterior half of the rectum. Be careful to keep the needle point about $\frac{1}{2}$ inch away from the rectum and so avoid puncturing the mucosa. If necessary a finger may be introduced into the rectum as a guide to the needle point. Do the same thing around the front half of the rectum. If this technic has been properly carried out and enough solution used to gently distend the parts, the sphincter muscle will very soon relax sufficiently to expose prolapsing hemorrhoids or other lesions and it should not be necessary to damage the muscle fibres by forcible dilatation.

Successful anesthetization is an important part of the procedure and on its accomplishment largely depends the ease, and sometimes the success, of the remainder of the operation. Perfect exposure of the operative field may now be had by applying moderate traction on the rectal mucosa by means of several Pennington forceps. The hemorrhoids may then be grasped and lifted up, one by one, with Hirschman's hemorrhoidal forceps, and secured at the base with a clamp, the long axis of which is held parallel to that of the bowel.

Technic



Fig. 3.

Using a moderately strong current, bring the needle-electrode into contact with, or insert it into, the hemorrhoid, push down the finger key on the electrode (Fig. 3) (or close the foot-switch) and allow the current to pass until the heat has entirely destroyed the neoplasm, even penetrating between the blades of the clamp. Remove the clamp and treat the other hemorrhoids in a similar manner. It is as well to allow the destroyed tissue to slough, and not to remove it immediately.

Instead of using an ordinary clamp and a monopolar current, one may use the bipolar current and a Bierman clamp which is so constructed as to permit the current to pass only through the tissues grasped in the jaws of the clamp. The length of the application must previously be ascertained by experimenting with a piece of raw meat the size of the neoplasm to be treated.

After the operation, a little carbolized vaseline may be introduced on the finger into the rectum or, in nervous patients where spasm of the sphincter may occur, a suppository containing $\frac{1}{4}$ grain each, of morphine sulphate and extract of belladonna, may be used.

The patient should be given a light diet and the bowels kept quiet for two days. On the third day Seidlitz powders or castor oil may be given and six ounces of warm sweet-oil injected into the rectum before the first movement. The feces should be kept soft by the use of mineral oil. After each movement the parts must be carefully cleansed and a suppository containing iodoform and tannic acid, 1 grain of each, introduced. This may be repeated after each bowel movement for a week.

If a small, external hemorrhoid is pres-

ent it should be anesthetized by injecting the procaine solution into the base, and the whole mass desiccated with the monopolar current.

If both external and internal hemorrhoids are present in the same case it is sometimes advisable to destroy the internal hemorrhoids first and leave the external to a subsequent operation. This latter may not be found necessary as, with improved local conditions, the external hemorrhoids may disappear.

If a painful external hemorrhoid is associated with internal hemorrhoids it may be considered best to afford relief to the patient by first destroying the external, and leaving the internal hemorrhoids until after the area has healed.

Ten to fourteen days after the operation the sloughs will come away, leaving a clean granulating wound which should heal completely in three to four weeks. During this period very little distress should be experienced, except possibly during the first few days.

The general condition of the patient must be given proper attention and everything possible done to prevent a recurrence.

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Comparative Value of Physical Measures in the Treatment of Chronic Purulent Otitis Media

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CHRONIC purulent otitis media is probably the most difficult of all types of middle ear disease from the standpoint of treatment. It is also the most important because of the danger of continuous supuration in the middle ear, from which extension to the cranial cavity is not uncommon. The deleterious influence of prolonged and continuous suppuration on auditory function and on the body in general is also of vital import. For these reasons a discussion of this subject is always timely.

Etiology and Pathology

Every chronic ear discharge is caused by one or more types of pathogenic microorganisms. It is a "mixed" infection which is usually resistant to the more recognized methods of treatment. Drainage is not always adequate nor ample, with the result that retention of the accumulated discharge quite often leads to bone necrosis.

Granting that the etiology is well recognized, that a history has ascertained the source of the disease, and that the naso-

pharyngeal tract and the body in general has had the benefit of careful medical and surgical attention, persistence of the aural discharge produces certain pathologic changes in the mucous membrane of the middle ear. If the disease is mild in character these changes may be slight, but variations have been noted to the point where the entire mucous membrane may become atrophied, or as stated by Politzer, the suppurative process may lead to ulceration and to destruction of the mucous membrane, which may be destroyed to the bone, whereupon the ulceration may involve the bone itself. The membrana tympani, too, suffers a true loss of substance brought about by the breaking down of the tissue. The mucous membrane of the eustachian tube is swollen and raised during the period of suppuration and presents, besides this, other definite pathologic changes too detailed to mention here.

The bacteriologic examination of the aural discharge will permit fair estimation of the gravity of tympanic suppuration. Wingrave, in a study of 100 cases of aural suppuration, found the staphylococcus predominating. Determination of the prevailing microorganism must be made, for upon this will frequently depend the nature of the treatment to be instituted and the probable outcome.

Hearing is not always impaired by the undisturbed course of chronic middle ear suppuration. And while it sometimes remains good with rather marked destruction of the tympanic contents, otologists are agreed that, in the large majority of cases, nothing but unfavorable effects can be predicted from prolonged aural discharge.

Review of Orthodox Measures

In an earlier communication we reviewed and classified the varieties of treatment employed by otologists for chronic purulent otitis media. This classification included: (1) antiseptics, (2) suction, (3) aeration, (4) irrigation, (5) desiccation and pulverization, (6) zinc ionization, (7) vaccines, (8) radiant heat and light, (9) ultraviolet radiation and, (10) surgery. To this should now be added the use of diathermy and x-rays.

Some writers present other classifications. Phillips divides his treatment into: (1) local therapy, (2) intratympanic operation (ossiculotomy) and, (3) the so-called radical mastoid operation.

This paper excludes consideration of cases which present strict surgical indications

such as polypi, cholesteatoma, or definitely marked bone necrosis. The prognosis, while apparently good in many instances of simple otorrhea, is not always borne out after prolonged therapy. In fact it is well recognized that the usual orthodox measures frequently fail to produce cures. It is for this reason that some otologists have experimented with and are now using physical measures.

Physical Therapy

Sufficient time has not elapsed for final conclusions, for improved apparatus and better technics are constantly being advanced. These will often render a certain method considerable advantage in producing results, whereas the method may have been condemned previously because of its unfavorable action. It is of interest, however, at this time, to analyze some of the important considerations with reference to the various physical agents which have been employed and to attempt conclusions which must be interpreted on the basis of our present knowledge in this work.

The agents which have been used in clinics and in private practice are: (1) the radiant-heat lamp (infrared rays), (2) the mercury vapor quartz lamp, air-cooled and water cooled, (3) galvanism (in the form of metallic ionization or ionic medication), (4) diathermy and, (5) x-rays.

It is occasionally true that, when small series of cases have been treated, some physicians become over-enthusiastic with the results obtained with one or the other of the physical methods. Such experience should not lead us to hasty conclusions without careful investigation of the results secured by others. The merits of any single procedure in a large series of cases frequently fail because the more stubborn suppurations are included in such a group. It is only by continued use over a long period of time and careful checking of large numbers of patients that an accurate guide may be had.

Radiant Heat-Light.—The favorable local effects on cellular metabolism and upon the circulation have long been known to be the virtues of radiant heat-light. Improved circulation is due to vasomotor response to heat stimulation, better described as hyperemia. The production of this change is also attended by increased leukocytic action. These effects are most desirable in the acute types of purulent otitis media, yet some authors claim to have secured good

results with radiant heat in the chronic forms of the disease. The intense hyperemia produced by radiant heat lamps, without the slightest discomfort to the patient, immediately places this method far ahead of the customary contact methods of applying local heat. The rays given off from these lamps have relatively long wave lengths which permit relatively deep penetration of the tissues, where this light energy is converted into heat energy. The effects which follow have already been mentioned. The application of radiant heat-light has many advocates. Gerstenberger and Dodge have employed it and quote the favorable results of Oeken and themselves. Mayer speaks of the efficiency of radiant heat in tuberculous otitis media.

We have employed radiant heat-light chiefly in acute otitis media, both in the catarrhal and suppurative types, and have been greatly impressed by the favorable results. It is not always possible, as some writers claim, to avert paracentesis of the drum membrane. In fact it is an error to depend upon radiant heat therapy to do what is best accomplished by incision and drainage. Radiant heat is as valuable after incision as before, because it promotes free drainage and tends to lessen and dry up the discharge.

We have not used radiant energy from incandescent lamps to any great extent for chronic ear suppurations, because better and quicker results have been secured by other means. It is quite likely that some good effects are possible in the chronic types of ear discharges; but, in our opinion, the greatest benefits are obtained in the acute and subacute forms of this disease in which the production of hyperemia and the migration of leukocytes are important therapeutic factors.

Ultraviolet Radiation.—This method has a definite place in the treatment of middle ear suppurations but should be used in selected cases. It is indicated principally in mild superficial inflammations. Poor results have been due to improper cleansing of the ear canal as a preliminary procedure. Ultraviolet rays, because of their limitation in penetrating beyond certain depths, require a clean surface for proper and adequate irradiation. For this reason debris and pus accumulations must be thoroughly removed before treatment is instituted. There is no doubt that the rays have a powerful bactericidal action, but it is not

always possible by the means we now possess to reach every part of the infected area. If a better access to the middle ear were possible with quartz applicators or by direct raying through a speculum, more satisfactory results could be obtained.

The use of anilin dyes such as alcoholic solutions of eosin or mercurochrome has been suggested as a means of carrying the rays to the diseased part, but experience has not borne out the view that this enhances the action of the rays in purulent middle ear disease.

There is no question concerning the advantages of ultraviolet radiation in some cases of tuberculous otitis. The water-cooled lamp has a definite place in the therapy of such infections. Mayer quotes Scheffer who was able to stop chronic discharges in four out of five patients with middle ear tuberculosis. We have been able to improve several cases of non-tuberculous ear infections and have obtained cures in a few others, but, as stated before, we believe that ultraviolet radiation is of distinct value only in selected cases. As a routine it is irrational and frequently disappointing in its action. The value of ultraviolet raying of the body with the air-cooled lamp, for systemic effect to tone up the system or to correct metabolic errors, is a valuable adjunct to local therapy. This phase of the subject will be enlarged upon later.

Metallic Ionization.—In zinc ionization the otologist has the most effective single physical therapeutic method for the treatment of chronic otorrhea. This procedure, as advocated by Friel, has many staunch adherents here and abroad. It will usually succeed in subacute and chronic cases in which the perforation is central and large enough to allow the zinc solution to pass into the middle ear. It is not successful in cases which are complicated by bone necrosis or in attic suppurations.

Friel states that, under the action of the zinc ion, the discharge and the germs on the surface, and, if need be, the tissues, are coagulated. Unlike a coagulation which would result from the action of corrosives or caustics, there is a minimal inflammatory reaction when zinc ionization is adopted.

It sterilizes the microscopic layer made up of serum, leukocytes and bacteria adhering to the surface of the mucous membrane, without irritating the tissues. The coagulum that is formed is, moreover, a sterile

barrier between the tissues and the exterior, thus permitting repair to take place. (Friel)

Friel has published a report on good results obtained in a series of over 600 cases of chronic otorrhea. Kanter, Warwick, McCoy, Granberry, Jobson, Fox and others also attest the virtues of this method and have cited statistics from their respective practices to bear out their claims.

In 58 consecutive cases of chronic otorrhea, we selected 25 as appropriate for ionization treatment. Nineteen have had complete cessation of discharge, but of this number 8 have not yet gone sufficiently long to pass final judgment on them. Suffice it to say that our results have been in strict accord with those reported by others. By means of zinc ionization we have been able to effect permanent cures in numerous stubborn cases which resisted orthodox methods and other physical therapeutic procedures.

Diathermy.—It has been observed that deep heat is extremely beneficial in some chronic ear suppurations. This is especially true if affected by means of diathermy administered by placing the active electrode over the mastoid of the affected ear and the indifferent electrode on the side of the face anterior to and opposite the ear being treated. We are of the opinion that by this method maximum diathermy action can best be secured in the middle ear. There is brought about improved circulation to the part by an initial hyperemia. Cellular metabolism is materially altered. These effects undoubtedly favor resolution of the diseased part. The number of treatments necessary will vary with the duration and extent of the suppurative process.

Rubley recently reported his experience with diathermy in the treatment of chronic otitis media. He used direct diathermy, lead electrodes and a current up to tolerance for thirty minutes, every second or third day. In over 60 cases treated, in a period of eighteen months, there were no untoward sequelae, and no extensions of the process into the mastoid cells, necessitating surgical interference.

We prefer our special headband and electrodes. The headband facilitates the administration of diathermy to the ears, is more comfortable to the patient and requires a minimum of time in adjustment and application.

As with other methods, our experience does not justify the statement that dia-

thermy can be advantageously employed in every case of chronic otorrhea. It has proven its chief value in old, resistant cases in which other methods had failed. Some patients who improved under ionization treatment but in whom the discharge recurred, were cured when diathermy was given subsequently. These same patients failed to respond to either diathermy or ionization alone.

X-rays.—Unfortunately our experience with x-ray therapy for chronic purulent otitis media has been disappointing. We have been unable to secure the good results claimed to have been achieved by others. We have found also that when x-rays and diathermy were given at the same treatment the condition was aggravated. X-rays may be useful in isolated cases for shrinkage of lymphoid tissue in the postnasal space, thus aiding in the promotion of improved pharyngeal drainage, and assisting in the partial arrest of some cases, but there is an absence of effect on local sepsis. Several workers have definitely shown that roentgenotherapy cannot be relied upon for destructive action on pathogenic bacteria.

General Treatment

Too much emphasis on local therapy has frequently been the means of neglecting systemic treatment. The influence of general diseases on many affections of the ear, nose and throat has been noted by numerous writers. In this connection one should mention the effects of vitamin deficiency on upper respiratory tract infections and the consequent influence of these on the persistence of middle ear discharges. There is no doubt also that body resistance, hampered by remote focal infections or by exhaustion states, plays a part. Metabolic errors, whether of general or endocrine etiology, are also of vital import and sometimes must be duly considered as likely means of hindering the recession of middle ear suppurations, in spite of careful and rigid management.

Although to a large degree empirical, the employment of ultraviolet baths in connection with local physical measures has been most advantageous. General treatment was given only in stubborn cases or when progress was slower than in the average. While not always of direct benefit, it was frequently observed to alter the state of the general health and many times to augment the results of otherwise ineffective local

therapy. For these reasons we have concluded that general body irradiations with the quartz-mercury lamp are of decided value as an adjunct to local measures.

Conclusions

1.—Rational therapy for chronic purulent otitis media assumes an understanding of existing pathologic changes.

2.—A diagnosis is all important, for results will often depend on the careful exclusion of certain systemic diseases.

3.—Orthodox measures, while sometimes successful in arresting chronic aural discharge, frequently fail in producing a cure, so that physical therapy is worthy of a trial.

4.—Radiant heat-light is advantageously employed in acute suppurative otitis media.

5.—Ultraviolet radiation is useful in selected cases of the chronic type but cannot be depended upon as a routine method.

6.—Zinc ionization is the most effective single method of combatting uncomplicated chronic suppurative otitis media, in which the perforation is central and large enough to allow the zinc solution to pass into the middle ear.

7.—Diathermy is useful, especially in difficult cases or as an adjuvant to zinc ionization when the latter is ineffective in producing the desired result.

8.—X-ray treatment of chronic aural discharge has failed to give the encouraging results claimed by some investigators.

9.—General ultraviolet irradiations, because of their systemic effect, and when employed in connection with local measures, sometimes prove advantageous in aiding the arrest of stubborn middle ear suppurations.

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30 N. Michigan Ave.

GOD is always in the world, and always at work in the world—now as truly as at any time in any period of history—with infinite variety in His ways of working, and with infinite patience, but with one purpose:

To enlarge men's vision, to deepen their insight, to broaden their experience, to purify and enrich their lives.

Therefore it is our business to work with Him at this task, always in progress, never finished; always moving towards its distant goal of perfect fellowship of men.

—Ernest DeWitt Burton,

(Late President, University of Chicago).

Surgical Seminar

Conducted by GUSTAVUS M. BLECH, M.D.

[Note: The Seminar is devoted entirely to the practical interests of surgeons. Problems and their discussions are solicited. Contributors must give their names, but whenever desired these will not be published. Questions for this department should not exceed fifty words. Address all communications for the Seminar to Dr. G. M. Blech, 108 North State Street, Chicago.]

Surgical Diagnostics (Continued)

It is not asserted that the older methods of gastroscopy have been free from certain dangers, especially those of perforating the esophagus. Any instrument, and especially a rigid one which cannot adapt itself to the natural curve of the tube leading to the stomach, must necessarily produce more trauma to the mucous membrane than is permissible. In this respect gastroscopy is connected with the difficulties encountered in cystoscopy, since for the latter procedure we also employ a rigid instrument. There is, however, this difference, that in cystoscopy we have a shorter range so that the tactile sense of the surgeon serves to caution him when he is going too far or when he is not making the best use of the instrument in accord with the anatomic situation.

In the gastroscope we must have some provision to overcome certain physiologic conditions which prevent undisturbed use of the optical apparatus. If the lens becomes covered with saliva or mucus, vision is rendered virtually impossible. This circumstance dictates some change in the construction of the lens, which in the cystoscope is firmly set in the extreme part of the tube. If that were not the case, one might as well construct a cystoscope of appropriate length, but if such an appliance be used, one would see mighty little indeed.

It is, of course, generally known that in order to inspect a cavity, the membrane of that cavity must be put on the stretch and that the medium with which this can be accomplished must be a transparent one.

Every one who has done cystoscopy knows that one sees far more and far more clearly when the bladder is filled with clean water than when it is distended with air. Now it seems impossible to distend the

stomach with water, at least throughout, and at the same time rid the stomach of its air content. Those who know the laws of optics will at once appreciate that, in the presence of air in a stomach only partly filled with a clear fluid, there will appear light reflections which must prove disturbing for proper interpretation of the lesion or lesions to be studied.

To this must be added that few patients will tolerate large quantities of water without at once choking or vomiting. This applies also to the utilization of carbonic acid for purpose of inflation. From this it follows that the sole means of putting the stomach "on the stretch" for the purpose of gastroscopy is by inflation with air, though, of course, this reduces somewhat the clearness of the picture.

The credit for having produced a gastroscope which so far has proven the most practical and most useful, is due Dr. Hans Elsher of Berlin. Basing his researches on an irrigating cystoscope with an optical apparatus separated from the tube, Elsher constructed most ingeniously an apparatus similar in character but adaptable for gastroscopy. A rubber attachment at the extreme end facilitates the passage of the appliance into the stomach.

In spite of the perfection of the gastroscope, one must not imagine that all one has to do is to introduce the instrument, inflate the stomach with the bulb which is attached to each gastroscope, turn on the light and then see the whole stomach and every lesion in it. I have already alluded to the difficulty in technic, so that none but a specialistically trained man, who has studied the procedure either under a master or autodidactically on dead bodies and in animals, can perform gastroscopy in a satisfactory manner. Were I to attempt to discuss the technic in this serial, I would have to utilize at least twelve consecutive issues, and this is of course out of the question. But in order to complete this serial within reasonable limits, I will conclude this subject with a few general remarks.

First of all it must be pointed out that gastroscopy is the last and not one of the

first steps in gastric diagnostics. Ere one decides to make use of gastroscopy, one must have all other available data, including physical examination, chemical analysis of the gastric contents, roentgenography, sounding, etc.

Assuming no direct contraindications to exist, gastroscopy should be undertaken only under the following conditions:

1.—The examination should never be made except on an empty stomach.

2.—The best time for such work is in the forenoon, provided the patient has had neither food nor drink.

3.—Lavage of the stomach is not to be practiced before examination as all fluid cannot be removed and even a small quantity of water will interfere with the success of the examination.

4.—To make sure that the stomach is empty it is good practice to introduce a stomach pump, but under no circumstances must water be used to induce lavage.

5.—When tests and the stomach pump show the presence of solid and liquid residual contents, *thorough* lavage of the stomach, however, is an important preliminary procedure. This should be accomplished with the patient in the Trendelenburg posture, to insure through emptying of the viscus.

6.—Half an hour before examination the patient should receive $\frac{1}{4}$ grain of morphine, hypodermically.

7.—Systematic cocaineization of the base of the tongue, uvula, fauces and posterior pharynx, by means of a cotton applicator.

8.—The patient is placed on the examining table in the prone position. The lateral position, too, may prove useful. The patient should be freed from all obstructive clothing.

9.—Instruct the patient to breathe deeply, not to try to talk during the examination, nor to struggle. "Raise your hand, if you should feel pain," the patient is commanded.

The introduction of the instrument should be as gentle, if not gentler than the introduction of a cystoscope. As a matter of fact, if the proper position of the patient has been arranged, the instrument should glide into the stomach without the use of the least force. All force is strictly to be avoided. If the patient raises his hand to indicate pain, even if the examiner feels that this is done out of fear rather than actual sensitiveness, it is bet-

ter to keep the moral agreement and to withdraw the instrument for a while, to strengthen the morale of the sufferer.

As regards the technic of introduction, the reader need but recall what I have said in connection with esophagoscopy. The principles are virtually the same.

But, of course, here we have additional steps. As soon as the instrument has entered the gastric cavity it must be pushed down farther and farther until the rubber attachment comes in contact with the large curvature. When this takes place the examiner feels distinct resistance, which serves to warn him with regard to further introduction of the appliance.

As soon as the instrument is introduced, an assistant or trained person is instructed to inflate the stomach with the rubber bulb, which he takes the moment the tube has passed into the stomach. When the outline of the stomach wall becomes visible, inflation should be stopped, at least temporarily.

Elsner has published excellent drawings, in color, of gastroscopic findings. While it will be impossible to reproduce them, I will make an endeavor to describe the principal lesions as they appear in gastroscopy.

(To be continued)

Discussion of Problem No. 7

(See July issue, p. 539)

You are called by a colleague in consultation to see a boy, aged 12, who has suffered for over twenty-four hours with what you are told over the telephone is an acute case of appendicitis with septic intoxication.

When you arrive you learn that the past history of the patient as well as his family history is negative. He began to complain of nausea and drowsiness the day before and this was soon followed by frequent vomiting spells. The patient can be aroused with comparative ease and when questioned complains of pain in the "stomach."

Physical examination reveals a boy in semi-stupor; *tongue* rather dry and furred, with a sickening breath; *pulse* 90; *temperature* normal; *breathing* labored and irregular. *Chest examination* reveals nothing abnormal. The *abdomen* is tender to pressure only when the palpating finger strikes the epigastrium. The patient makes no sign of distress when the ileocecal region is palpated even deeply. The abdomen seems to be free from distention. The patient has been given a little milk yesterday, but since the attending physician has

seen him he has had neither drink nor food. The physician also had an ice bag over the right abdomen, applied every other hour.

Requirement: Tentative diagnosis and means necessary to complete the examination.

**Discussion by Dr. E. C. Junger, Soldier,
Iowa**

This problem impresses me as a toxemia of intestinal origin. I cannot imagine an appendicitis with so much absorption as to produce coma, without tenderness to the touch, without a high temperature and without a high leukocyte count. I am inclined to think rather of cerebral or meningeal involvement and certainly cannot accept the presence of an acutely inflamed appendix. At the same time it must be borne in mind that so-called acute indigestion, accompanied by fermentation, will cause a good deal of drowsiness and stomach irritation.

**Discussion by Dr. Herman J. Kooiker,
Albert Lea, Minn.**

Although little or nothing is told us about the history of the present illness, the possibilities of the causative factors in this problem center around the condition of acidosis.

Of the various affections producing this condition I would consider first cyclic vomiting, because it fits in with the problem in the suddenness of the onset without prodromal symptoms. The symptoms as described are more or less typical.

Second, it must be recalled that diabetic coma, in the beginning stages, may appear comparatively suddenly.

Third, nephritis following scarlet fever, of such a mildness that it passed unnoticed, is to be considered. It may happen that this disease progresses to virtually complete anuria without edema.

But the first two conditions are the most plausible from the standpoint of the information given in the problem, and of the two I lean towards diabetes.

Urinary analysis would undoubtedly confirm the diagnosis beyond all doubt. The presence of acetone, diacetic acid or butyric acid alone, without the presence of sugar, would establish the diagnosis of acidosis found in cyclic vomiting. The presence of sugar in addition would, of course, signify diabetes mellitus; while, on the other hand, the presence of albumin would point toward a nephritic condition. It goes with-

out saying that a microscopic examination should follow in the last named condition.

From the limited history and facts as given, one gains the impression that the boy is severely ill, and if the above named tests do not fully establish the diagnosis, the examination of the blood for sugar, urea content and a leukocyte count are the laboratory tests further indicated. In conclusion I would mention a spinal fluid examination, if everything else has failed to shed any definite light.

**Discussion by Dr. J. A. Larrabee,
Barnard, Mo.**

After taking into consideration the situation as described, I am inclined to diagnose diabetes mellitus.

To confirm this diagnosis the blood and urine examination will show the presence of sugar, acetone, etc.

As regards the treatment, we have in insulin a remedy which seems indicated in this class of cases, though it should be administered guardedly.

**Discussion by Dr. Robert S. Gregg,
Chicago, Ill.**

Perusal of the report on the condition of the patient, together with the physical findings on the first examination, leads me to the opinion that there is a condition of acetonuria. A complete urinary analysis for acetone, which is found in the urine of patients with diabetes, fevers, digestive disorders, etc. would help to clear up the diagnosis and dictate the appropriate treatment.

While acute appendicitis and acetonemia may occur at the same time, this will be an extremely rare coincidence, because of the widely different etiology of the two affections.

The case in the problem is no doubt one of periodic vomiting, and if seen early enough there should be no difficulty in establishing the differential diagnosis from acute appendicitis, because both conditions have typical forms which are easily distinguished from each other.

Editorial Comment

This is not a surgical problem but I have no apologies to offer for having presented it in this department. This problem was considered a surgical one, with the diagnosis of appendicitis by one physician. Any surgeon is liable to be called to operate for appendicitis and find not only the diagnosis to be wrong but a surgical operation de-

cidedly contraindicated. The surgeon must be enough of an internist to be on guard against just such pitfalls as presented in the problem, which represents one seen in actual practice. This circumstance alone justifies its presentation in the Seminar. True, it would have been better to label the problem as an error, but then I would have betrayed the actual findings in advance and prevented the carrying out of the principal purpose of the Seminar—to stimulate diagnostic thinking.

I have not received so many responses to this problem as usual, and I am somewhat surprised at this, for this discussion is as important, from a clinical standpoint, as any we have had in the past. It is the commonplace that is often easily overlooked in our constant endeavor to think in terms of ultra-science, and one such error may often blast the reputation of a conscientious practitioner who has built up a clientele by years of hard toil and privations.

I am particularly glad that Dr. Junger has sent in his diagnosis as he saw it, because it enables us to make comparisons.

Let us picture in our mind the actual situation. You are called away at some distance from your place of work to meet in consultation with a member of our profession who has made a tentative diagnosis of appendicitis. Dr. Junger is perfectly right in coming out bluntly that the case does not impress him as an acute appendicitis, even if the toxins were to be held responsible for the semi-comatose condition of the lad. That is a fine point. We examine the patient for appendicitis and find nothing to confirm it. We are now on our guard and try to locate the trouble. Remember, you have no immediate facilities for laboratory tests. I have so phrased the requirement as to indicate that certain laboratory tests are needed.

Dr. Kooiker has analyzed the situation very well indeed. I cannot improve on it. We go through in our mind encephalitis, toxemias, the disturbances of metabolism, etc. and we are absolutely compelled to rule out everything except acidosis, for all the other affections producing coma-like conditions, have physical characteristics which we can recognize by ordinary methods of examination. A specimen of urine taken to the office and examined by the simplest

tests, would at once show us that we were right. There remains but to take up two questions. One is purely a moral one, which I shall touch upon briefly, and the other is a scientific one, which I can dismiss in a few sentences.

The moral one refers to your relation to the colleague who called you in consultation. I leave it to your conscience to decide what to tell the parents or relatives. What I did under the disagreeable circumstances was to confirm the diagnosis of the colleague, but suggested that we may yet succeed in averting an operation, giving the attending physician credit for having submitted the proposition of non-operative therapy. The joy of the parents was boundless, and I have made a warm friend of the attending physician. I have never regretted that course of action, and the moral philosophers can moralize to their hearts' content.

The diagnosis of acidosis was based on the comatose condition and the entire absence of tenderness in the appendiceal region. As for the tenderness in the epigastrium, that was ascribed to the irritation due to vomiting, in the absence of the characteristic pulse seen in peritoneal disease.

The urine showed a high percentage of diacetic acid. As the child had been on starvation, I at once ordered a carbohydrate diet. This, plus the usual medication, resulted in a speedy cure.

In conclusion, the mistaking of acidosis for appendicitis is not a rare occurrence. I myself have seen only one other case, and this time it was a surgeon who insisted on immediate operation. Had the young girl in question been anesthetized, the annals of surgery would have been scandalized by an unnecessary death!

In discussing this problem with several experienced surgeons I learn that they, too, had had occasion to save colleagues from such terrible pitfalls.

Exercise No. 1

A young girl, without any history bearing on the case, and in good health, with almost lightning-like suddenness developed painful torticollis. Let us have a free but brief discussion as regards acquired torticollis, with reference to etiology and therapy.

Clinical Notes and Practical Suggestions

Nomenclature of Light Therapy

THE physicist has divided the region of the ultraviolet into the near, middle and far. As more interested in dermatology, it has occurred to me to divide the ultraviolet in a way more in accord with physiology. I advanced this new concept before the scientific session of the annual meeting of the American Medical Association. I have taken two set places in the ultraviolet: One, the limit in natural sunlight, which is at 2900 Angstrom units; and two, the conventional barrier of glass to ultraviolet, which is about 3200 A.u., dividing the ultraviolet as *intravital ultraviolet* (from 3900 to 3200 A.u.), which represents the ultraviolet which passes through ordinary glass, *vital ultraviolet* (from 3200 to 2900 A.u.), which is the ultraviolet present near noon in the summer sunlight and which does not pass through ordinary glass and *extravital ultraviolet* (below 2900 to the limit of penetrability of air (about 2000 A.u.).

Vital ultraviolet is the zone in sunlight which is necessary for the normal growth of babies. It is the zone which sunburns and sun tans. It is the zone which affects the calicum metabolism of pregnant women. It has at least one of the lines which acts on the precursor of the antirachitic vitamin present in otherwise nonactive substances.

From my experiments and reviews, I am certain that there must be a threshold intensity for the *vital ultraviolet* for effective phototherapy and that we should no longer be misled by division into broad bands as infrared, visible, and ultraviolet; or even by the phraseology of the subdivisions into near, middle and far ultraviolet which have no relation to modern physiologic reactions. We now have the opportunity of stressing that part of the emission of the radiator or light emanator which lies in the zone from 2900 to 3200 A.u. To reproduce

effects, and advance the field of phototherapy, the factors of quality, intensity, time, and distance should be stressed. The only variant would then be the patient.

It would appear that the suggested terminology has much to recommend it despite the possibility of laboratory shortcomings. It certainly has some basis in physiologic fact, as life on this earth has thrived for centuries and more under the radiation of solar energy. Findings of the physicist in studies of the ultraviolet made along the limits suggested would be more readily translated into physiology, and further into disturbed physiology, which we call pathology.

There seems to be a good deal of confusion in the minds of many regarding some of the terms used in connection with phototherapy, and in the hope of clearing up some uncertainty the following definitions are offered. These, with a number of others, will be presented to the proper committee of the American Electrotherapeutic Association for their approval.

Abiotic rays: radiation opposed to, or incompatible with life.

Actinic rays: radiation capable of causing chemical activity.

Actinometer: apparatus designed for determination of intensity of actinic rays.

Actinotherapy: therapeutic application of chemical rays.

Angstrom unit: unit used for measuring wave length, named for Anders Jonas Angstrom, Swedish physicist, 1814-1874.

According to the Metric System:

One meter equals one thousand millimeters.

One millimeter equals one thousand microns.

One micron equals one thousand millimicrons.

One millimicron equals ten Angstrom units.

Measured in inches, an Angstrom unit is equivalent to one two hundred and fifty-four millionth of an inch.

Arc: continuous passage of electrical current between two or more separated electrodes.

Carbon arc: an arc between separated carbons.

Crater arc: an arc between two carbons or other electrodes which acts to form a crater on the positive pole, if direct current is used.

Flame arc: an arc between impregnated electrodes at such amperage as to cause volatilisation of the core with a resultant flame.

High intensity carbon arc: an arc between a special, revolving, positive, impregnated carbon electrode and a non-revolving, properly placed, negative carbon, of such amperage as to have a cup formed from which the stream of energy is forced.

Magnetite arc: direct current with a copper electrode and a second electrode of a magnetite stick, formed by forcing a composition containing magnetite into a thin steel tube.

Mercury vapor arc in quartz: an arc within a quartz tube containing mercury as the cathode, and either mercury or tungsten as the anode.

Border rays: radiation quite close to that of the longest x-ray, perhaps about the first four Angstrom units.

Burn: word incorrectly applied to mild or severe degrees of erythema reactions following exposures to therapeutic radiation.

Electromagnetic spectrum: theoretical existence of ether waves of such frequencies as extend from the shortest known gamma rays of radium (or possibly Collidge rays) through the longest radio frequency rays (or possibly the cosmic rays of Pupin).

Finsen arc: *Finsen carbon arc*: *Finsen light*: *Finsen therapy*: Finsen utilized carbon electrodes of wider diameter at high amperage direct current electricity. Cooling and filtration gave maximum radiation to the part treated in the blue and violet and the contiguous part of the ultraviolet.

Fused quartz: transparent glass-like substance made from natural silica, which is water clear, heat resistant, and permits the passage of ultraviolet rays.

Greutz rays: see border rays.

Heliophobe: one unusually sensitive to exposure to the sun's rays.

Hematoporphyrin: iron-free derivative of hemoglobin said to have the tendency of rendering men and animals sensitive to light.

Hertzian rays: waves longer than the longest of the infrared, but shorter than the radio frequency waves. Named for Heinrich Hertz, their discoverer.

Impregnated carbons: electrodes of carbon steel with cores of fillings of various metals and salts of metals.

Infrared region: that portion of the electromagnetic spectrum beyond the red in which the length of the waves is greater than 7,700 Angstrom units, and extending to at least 500,000 Angstrom units.

The therapeutic infrared is that portion of the infrared useful in medicine and surgery and probably extends from 7,700 to 14,000 Angstrom units.

Inverse square law: The radiation from a point source striking a known area decreases as the square of the distance from the source.

Irradiation: acts of projecting rays upon a subject or substance.

Light: in the strictest sense, the term is confined to those wave lengths of the spectrum capable of affecting the sense of sight.

Lyman rays: wave lengths at about 12,305 A.u. to 600 A.u.

Millikan rays: wave lengths at about 136.5 A.u.

Photecy: radiated substance affects another body as would radiation itself.

Photodysphoria: intolerance to light energy.

Photologist: one skilled in the art and science of the theory and application of light energy.

Schumann's rays: radiation lying between 1,850 and 1,230 A.u.

Ultraviolet: radiation in the zone contiguous to the violet which does not affect the sense of sight. In Angstrom units, this zone lies between 3,900 A.u., and the limit of the penetrability of air to 1,850 A.u.

Ultraviolet regions: the physicist had divided the ultraviolet for convenience into the near, middle, and far ultraviolet.

Near ultraviolet: from 3,900 to 3,000 A.u.

Middle ultraviolet: from 3,000 to 2,000 A.u.

Far ultraviolet: beyond 2,000 A.u.

The physiologist would divide the ultraviolet as Intravital, vital, and extravital ultraviolet.

Intravital ultraviolet: radiation of ultraviolet which does pass through glass, viz., 3,900 to 3,200 A.u.

Vital ultraviolet: radiation present in sunlight which does not pass through glass and which seems to be necessary for the processes of animal life, viz., 3,200 to 2,900 A.u.

Extravital ultraviolet: region of ultraviolet beyond that present in summer sunshine—less than 2,900 A.u.

Ultraviolet erythema: redness of the skin surface due to exposure to radiation of short wave length energy of the zone of ultraviolet. Ultraviolet erythema comes usually after an incubation period measured in hours.

Visible spectrum: decomposition of white light between 7,700 to 3,900 A.u.

Wave frequency: number of oscillations per unit of time.

Wave length: distance between crests of two adjacent alternations.

HERMAN GOODMAN, M.D.,
New York City.

RELAXATION IN EXHAUSTED STATES*

Many cases of "nervousness," and various psychoneuroses and exhaustion states are due, in part at least, to the fact that the patients have *never learned to relax*.

The power of complete relaxation is by no means inherent in most of us and we must learn it by regular and persistent practice. The best way to carry out this practice is to have the patient sit in a comfortable chair or, preferably, lie supine on a convenient couch or table, and then contract, successively, the various muscle groups of the whole body, carefully observing the *sensations* produced by such contractions. Certain movements may be opposed by the hand of the physician, in order to make the contraction sensation more distinct and recognizable.

As soon as a patient knows how the various muscle groups *feel* when they are contracted, he is instructed to *release* the tension of the various muscles, one after another, beginning at the feet, until the sensation of contraction is entirely lost.

*Abstract of a lecture delivered at the A.M.A. Meeting, Washington, D. C., May 17, 1927.

In the beginning, this educational practice consumes a good deal of time and makes heavy demands upon the patience, persistence and enthusiasm of the physician, but results, demonstrable by laboratory methods, have shown that it amply repays the time and trouble spent, in the treatment of many cases of the psychoneuroses and neuroses and also in mucous colitis, spastic colon, esophageal spasm and other similar disorders.

Having once learned the technic of relaxation, with the help of the physician, the patient must practice it by himself, *every day*, for half an hour or more, once or several times a day, according to the nature and circumstances of the case.

EDMUND JACOBSON, M.D.,

Chicago, Ill.

REPORT OF CASES TREATED WITH INFRA-RED RADIATION

We recently purchased a lamp for infra-red ray production (Zoalite) and felt that it might be of some interest to report briefly the cases so far treated and the results observed.

No case was rejected for treatment where it was felt that some benefit might be expected. Up to date, 15 patients have received 27 treatments. In all of these but one, the pain was immediately lessened (even during the treatment, which, in most cases, was of 20 minutes' duration), and in a number the relief was so pronounced that the patients remarked about it. The writer received one treatment for furuncle of the neck with gland enlargement, and had no further difficulty.

The following are a few of the cases:

F. E.: Had stiffness of a finger following an old fracture; could not extend it; suffered severe pain. After three treatments all pain disappeared, and he was able to extend the finger fully.

F. T.: Chronic arthritis of both knees. After three treatments he was able to walk better and the pain was almost negligible.

E. S.: Sciatica. After two treatments, the patient was much improved and could move about with less pain. Refused further treatment.

W. J. C.: (One of the staff physicians). Synovitis of the wrist from an old fracture. Three treatments, after which all pain, both superficial and deep, left him and he was able to move his thumb freely.

H. J.: Myalgia of the shoulder. One treatment was given and the patient recovered.

J. R.: Ulcer of the penis. After one treatment the itching was controlled and the ulcer began to heal.

H. S.: Painful callus from fractured rib. After one treatment the pain was so much improved that he did not require further treatment.

J. B.: An epileptic. Complained of numbness of one arm and hand. After two treatments the patient was much improved and had no further difficulty.

W. F.: Eruption, resembling ringworm, on the face. Two treatments gave some relief of the itching, but it was necessary to give arsenic, intravenously, to clear up the condition.

Whatever the *modus operandi*, I feel that, in selected cases, especially where the patient consults the physician for the relief of pain, the infra-red lamp may be of great assistance.

HYMAN TUCKER, M.D.,

Meridian, Mississippi.

[Infra-red rays are a comparatively new agency in therapeutics and it is important that we arrive at an estimate of their powers and limitations as promptly as possible. The manufacturers of apparatus for generating these rays are making large claims but, so far, actual clinical reports of their use are rather meager. Such notes as this are helpful.

If the infra-red radiations will accomplish nothing more than the prompt relief of pain they are well worth while. Perhaps they do much more than that. If many of those who are using this agency will report results we shall soon be in a position to estimate its value.—Ed.]

CONSULTATION REQUESTED (A Case Report)

I was called at 4 A.M., June 19, 1927, to see a patient at a resort two miles from town. Messenger stated that the patient was having fits and had cuts on his head. Found patient cyanosed; stertorous breathing; widely dilated pupils (equal); pulse 140. Those present reported his having had 5 or 6 hard convulsive seizures between 3 and 4 A.M.

In a few minutes the patient revived and became very violent physically—it took

three men to hold him. In ten minutes another attack started, beginning with twitching in the right hand, flexors of arm and right side of face, rapidly extending to whole body, accompanied by cyanosis and stertorous breathing; spasm lasted not to exceed $1\frac{1}{2}$ or 2 minutes. In a few minutes patient was again physically active, the whole attack lasting not more than 5 minutes. Patient foamed at mouth.

After coming out of the spasm he appeared to have equal use of all his limbs but suffered *complete aphasia*. Patient had three attacks while waiting for the ambulance and had three hypodermic injections of morphine, $\frac{1}{2}$ grain each, and 1/100 grain of hyoscine with the last dose, before he became quiet enough to be moved. He then walked to the ambulance (with assistance) and sat up during the 13 mile drive to the hospital at Dowagiac.

Those present said the young man had apparently been in excellent health the night and day before; was physically active; had fished and played quoits all day, retiring early Saturday night to be ready for the early morning fishing. His only complaint was that he needed a physic as his bowels had not moved properly for several days. Awakened by a noise his friend found the patient on the floor of the cottage in a convulsion at 3 o'clock. He had an abrasion on the forehead over left eye, about an inch in diameter. Later, at the hospital, we found a wide welt under his right shoulder blade.

Arriving at the hospital at 6 A.M., the patient walked in, with assistance, and insisted on going to the bath room where he was unable to urinate and bowels did not move. While on the stool I catheterized him, obtaining 30 ounces of cloudy urine; Sp. Grav. 1020; slightly acid; moderate amount of albumen; sugar negative. On withdrawal of the catheter a small amount of blood came away. Gave an enema of NaCl with soda. Patient took two quarts. No return. Was given another quart. No return. Digital examination revealed a normal rectum and anus; no hemorrhoids, internal or external; marked spasm of the sphincters.

There was no history of convulsions or spasmodic attacks of any kind; the entire history pointed to excellent health; he had passed a life insurance examination a short time before. No history of scarlet fever or other serious diseases.

Being impressed with the fact that the young man was suffering from some sort of grave cerebral accident, I called a neurologist who went over the patient thoroughly and took spinal fluid and blood for Wassermann test and a sample of urine. Blood pressure was 150/70; pupils contracting somewhat and now unequal (right somewhat larger than left), no reaction to light or, so far as we could tell, to accommodation; normal disc (not choked); tongue protrudes slightly to right; patient constantly rubbing left side of head and occiput; patient cyanosed; respirations 12 to 15; using both hands and legs apparently equally well; reflexes all normal; no Babinski reflex.

After arriving at the hospital another $\frac{1}{2}$ gr. of morphine was required to quiet him. Most of the enema previously given was passed and the abdomen was flat. No further convulsions after arriving at the hospital; but, during the day (19th), perhaps four or five slight premonitory symptoms beginning with twitching of right hand and arm and right side of face, more or less severe, but going no further. Evening urine of the same day (catheter) showed Sp. Grav. 1012; faintly acid; cloudy; much greater amount of albumen; total quantity 22 ounces.

At 6 P.M. another consultant suggested bleeding and 13 ounces of blood were drawn from the median cephalic vein.

Sunday afternoon (June 19) the patient had two hot packs (about 45 minutes in each pack) and two hypodermic injections of 1/18 grain pilocarpine. After admission to hospital pulse had reduced to around 90; full, regular. In the packs pulse ran up to 120 but remained of good quality. Forty minims of Tr. Digitalis was given preceding each pack. Patient began taking liquids freely and bowel movements were satisfactory.

None of us could find anything outside of the nephritic condition on which to base a diagnosis.

Monday, June 20, another hot pack was given with excellent results. Catheterized specimen of urine Monday morning; 12 ounces. Sp. Grav. 1012; neutral; very heavy albumen content.

Tuesday morning, June 21, following a rather severe twitching of right hand, arm and right side of face, a very pronounced wrist drop developed and a marked irregularity of the right pupil was noticed. Dr.

E. suggested that another neurologist be called. Dr. P., of Chicago, was called. Careful examination; blood and spinal fluid taken; also urine. Patient now voiding freely.

Tuesday morning we received the following laboratory reports: Blood Wassermann test, negative; spinal Wassermann test, negative; nonprotein nitrogen content, 50; Lange's gold test, 5431000000; Pandy test, plus; urine: heavy albumen; casts (character not stated); ammonium sulphate, phase 1, plus.

Other reports showed blood and spinal Wassermann tests, negative; Pandy test, 2 plus; ammonium sulphate, phase 2, 2 plus; gold test, 1112210000; urine: blood elements and Gram-negative bacilli found by direct examination; B. alkaligenes found on culture.

On June 21 we found spinal white cell count, 6; blood leucocyte count, 13,400; pulse 80, full and regular; patient beginning to form sentences with difficulty; apparently understands everything; walks to bath room by himself; eye ground less congested; no choked disc; semi-paralysis of right hand; complains of severe pain in left side of head and occiput—wants relief from this (sign language); unable to spell or write; free bowel movements; taking fluids freely, also several glasses of milk and retention enemas of salt solution.

Doctor made no diagnosis but thinks perhaps the trouble lies between encephalitis, gumma, abscess, and (more remotely) a tumor, in the order named. The main reflex disturbance seemed to be over the right side of the abdomen and chest.

Wednesday, June 22, patient having hemorrhages from the bowel. Ice bag applied and morphine given. He had 24 bloody stools in 12 hours, a teacupful to a pint each time. Pulse 107, full, soft and regular. The last two stools, at 9 A.M., were dark in color; previous ones all bright red.

Called a surgeon, at the request of patient's father, who, after a careful examination, made a positive diagnosis of cerebral hemorrhage. In his opinion one of two things occurred: Either as a result of some cardio-renal disturbance or in an effort to find his way out of a strange house in a hurry, he stumbled and fell, striking his head with sufficient force to cause a small hemorrhage, involving the speech center and right arm. No explana-

tion of the hemorrhages was given. (He had had a dose of calomel and a dram of mercury by inunction the night before.)

Further laboratory reports showed blood Wassermann and Kahn tests, negative; spinal Wassermann test, negative; gold test, 0001211000; ammonium, phase 1, negative; phase 2, slightly positive; Widal test, negative; spinal cell count, 6. Unable to make a diagnosis.

Thursday, June 23: Patient improving slowly all the time; speech slowly returning; asked for strawberries and cereal (unable to spell strawberries but finally pronounced it). Pulse 72, full and regular. High enema showed a little bright-red blood. No complaint of severe abdominal distress; slight distension over upper abdomen; slight tenderness, general; no rigidity. Patient recognized me today, having been in my office 6 weeks ago to renew a policy.

Friday, June 24: Talking much better; smelled a cigarette on me and asked for one; wants to go home.

Saturday, June 25: Still greater improvement; abdomen better.

Sunday, June 26: Further improvement; pulse 70, full and regular.

Monday, June 27: Talks splendidly except for slight hesitation on particular words. Says he remembers nothing after going to bed on Saturday night, previous to attack, except that just before going to sleep he had a terrific cramp in the calf of his right leg, rubbed it out and then went to sleep. However, states that he has noticed for past three months that he had difficulty in pronouncing certain words and some difficulty in finding a word; and also that he had, at times, some difficulty in using the right hand—unable to handle it well and felt awkward at times. No dizziness; no sinus trouble; no ear trouble. Patient is 33 years of age, married 5 years, two fine, healthy children and wife expecting another in two weeks, no miscarriages, etc.

What's the Answer?

E. M. CUNNINGHAM, M.D.,
Cassopolis, Mich.

[This extremely interesting case is open to discussion by our readers and we hope that several will discuss it, giving reasons for their opinions and making their remarks as detailed as is consistent with brevity.—ED.]

THE "TWO GLASS TEST" IN GONORRHEA

A study of the urine passed in two portions, in two separate glasses, gives valuable information as to the condition and progress of a case of gonorrhea. Such a study should be made at frequent intervals and careful records kept.

The significance of some of the commoner combinations encountered in this test is briefly indicated by the following chart:

1st glass 2nd glass

Cloudy	Clear	a. Acute anterior urethritis.
		b. Acute anterior urethritis with mild or subsiding posterior involvement.
Hazy	Clear	a. Mild acute or subacute anterior urethritis.
		b. Mild acute or subacute anterior urethritis with mild posterior involvement.
Shreds	Clear	a. Subsiding anterior urethritis.
		b. Subsiding antero-posterior urethritis.
		c. Chronic urethritis generally as the result of deeper foci of infection in the prostate or other associated small channels.
Cloudy	Cloudy	a. Acute antero-posterior urethritis.
		b. Cystitis or upper tract suppuration.
Cloudy	Hazy	a. Subacute or mild antero-posterior urethritis.
Hazy	Hazy	a. Subacute or mild antero-posterior urethritis.
Clear	Cloudy	a. Seminal fluid.
		b. Contents of pus pocket.
		c. Sedimented mucus or phosphates from a poorly emptying bladder.
		d. Slight terminal bleeding.

DRS. P. S. PELOUSE and F. S. SCHOFIELD,
Philadelphia, Pa.

ACTIVE PRINCIPLES

The active principles of plants, mainly alkaloids and glucosides, form one of the most important chapters of chemotherapy. The first knowledge of their existence was derived from Serturmer's discovery of morphine, in 1806. This was quickly followed by many others, so that at present they are known to exist in every plant. This important discovery has been the basis of scientific research on the action of drugs, enabling the physician to give a definite quantity of active principles by hypodermic injection, and to study their effect on animals and man, in health and disease.

Alkaloids are nitrogenous, crystalline substances derived from plants. They form salts with acids, usually soluble in water, in which they are most frequently employed on that account.

Glucosides are active principles of plants that can be broken up by the action of a mineral acid into sugar and another radical. Resins, also of vegetable origin, are mixtures of various substances usually not soluble in water, but freely soluble in alcohol, ether and chloroform; and oleoresins are mixtures of resins with a volatile oil.

The active principles of plants and the mineral salts that resemble them in their action are by far the most important in the treatment of disease. How they act is not fully understood, though it is at present generally accepted that they form a union with some of the ingredients of the cells of the organism, producing physiologic effects by chemical action. Usually this union represents a very loose compound, though in some instances it may be so firm as to make a separation of alkaloid and tissue difficult. Most of the drugs employed possess an affinity for certain cells of the body; for instance, they will not unite with the protoplasm of the cells of the central nervous system or those of the terminal endings of certain peripheral nerves. A few, termed general protoplasmic poisons, will combine with almost any of the tissues of the body. Union of an alkaloid with the cell protoplasm changes the reaction of the cell to the physiologic stimuli, altering its function or inhibiting it entirely. Nerve cells receive and convey sensory impulses to centers, deposit them, and convey motor impulses.

Inorganic salts possess, when in solution, specific chemical action due to the ions into

which they divide. The ion that is most foreign to the organism is predominating in the physiologic action of dissociated organic salts.

In chloride of potash, the potassium ion predominates, because every cell of the body contains a large amount of chlorine. When potassium bromide is administered the bromine is most prominent, and sodium salts act by their acid ions because sodium ions are present in large numbers in the organism. The salt action of this class of chemical compounds differs entirely from their chemical action, is determined by the law of osmosis and depends, consequently, on the number of molecules and ions contained in the solutions, independently of their chemical nature.

Animal and vegetable cells contain crystalloids, inorganic or organic salts and colloids, and complicated chemical compounds. Crystalloids diffuse; colloids do not. The proportion between the two within the cells is of the greatest importance for their function. Even minor changes may produce serious disturbances and cause the death of the cell if they are considerable. Salt solutions not isotonic with the body fluids, when introduced into the organism, produce such changes. The cells of the living organism show a specific affinity for certain substances, possessing selective power that so far has not been satisfactorily explained.

Certain salts and sugars are rapidly absorbed by the epithelial cells of the intestinal mucous membrane, but do not pass into the red cells of the blood; and sodium sulphate is not absorbed by the cells of the intestines, but passes with greater facility through vessel walls. Concentrated salt solutions dry the tissues, living or dead, so much so that they prevent the growth of microorganisms.

The effect of the treatment of gastrointestinal catarrhs at various watering places with mineral waters, poor in salts, depends upon the action of hypotonic salt solutions upon the mucous membranes. They cause swelling and destruction of the cells and their regeneration. Concentrated solutions irritate and cause nausea, vomiting, and inflammation of the gastrointestinal mucous membrane.

In the presence of the sodium chloride of the organism, potassium carbonate yields potassium chloride and sodium carbonate. Both, useless to the system and

excreted by the kidneys, act as diuretics.

Strychnine and the closely allied brucine are alkaloids derived from the seeds of *Nux Vomica*. Strychnine, like most of the alkaloids (but little soluble in water), when used in the form of sulphate or nitrate is rapidly absorbed. To a large extent it is rapidly eliminated unchanged, though a small part remains and accumulates in the system and is only slowly gotten rid of.*

GEORGE J. SCHULZ, M.D.,

Washington, D. C.

CREDIT

The most trouble in making collections comes where patients have not been made to appreciate their credit. It is human nature for a person not to appreciate the things he can get without effort.

Unless the patient is diplomatically made to realize that he is being granted a favor when he is given credit, he is not going to appreciate the favor—and it is a favor to give a man credit in time of need.

Before granting credit it is sound business to investigate a man's standing as you would if you were going to loan him a like amount of money, for that is what it comes to when you look at it squarely.

RUEL MCDANIEL,

(In *Med. Economics* for June, 1927).

MASSAGE

The main physiologic effects of massage are:

- 1.—Assisting the circulation.
- 2.—Aiding the movement of lymph.
- 3.—Exerting tension on some structures which we hope to free or stretch.

The effect of massage on the body fluid reaction, according to Pemberton, is a restoration to normal.

The application of massage should be left to technicians chosen for their skill rather than their personality. Supple and warm hands, with an educated sense of touch, are preferable to great strength. Any hard massage that calls forth a protective con-

traction is an error in technic. A good way of judging a technician is by the way she places the patient for the treatment. The patient should be in a position that permits the utmost possible relaxation and that is the recumbent position. This applies to the treatment of the upper extremities as well as any other part of the body.

The kind of lubricant a technician uses usually shows her experience. For any normal skin, a lubricant with a fatty base is best, but when a skin shows tendencies to eruptions about the hair follicles, a soft powder is preferable.

Massage should not be used about the callus in fractures about the elbow, but is of great value above and below the elbow.

—DRS. K. G. HANSON and R. G. BIRRELL,
in *Am. J. of Surg.*, July, 1927.

LANDRY'S PARALYSIS

For one reason or another the attention of both the profession and the public has recently been directed to the condition of acute ascending paralysis known as Landry's paralysis. This is believed to be a toxic sequella of infection.

Acute ascending paralysis is a disease of early or middle adult life; it differs from polyneuritis and poliomyelitis by the absence, in long-continued cases, of muscular atrophies, reactions of degeneration and sensory symptoms of paralysis. The toxin seems to leave the sensitive neuron intact and to affect exclusively the motor function, without impairing the structure.

The consensus of neurological opinion is that acute ascending paralysis is probably a special form of multiple neuritis affecting the lower motor neurons, with secondary changes in the anterior horns and muscles, resembling or identical with those observed in poliomyelitis.

Up to now, only general therapeutic measures have been suggested for treatment. If the disease does not terminate fatally within two or three weeks the patient will probably completely recover without nervous stigma.

(Condensed from "Current Topics,"
Internat. Med. Digest, April, 1927.)

*Lerch, Otto: Rational Therapy. The Southworth Company. 1919.

The Leisure Hour

Conducted by GEORGE H. CANDLER, M.D.



*The Clock of Life is wound but once
And no man has the power
To tell just when the hands will stop—
At late or early hour.
NOW is the only time you own;
Live, Love, Toil, with a will;
Place no faith in "TOMORROW," for
The Clock may then be still.

—G. H. C.

*This little poem originally appeared on the cover of CLINICAL MEDICINE for June, 1922. It is reproduced because, as it is continually bobbing up in exchanges (often labelled "author unknown") it must carry a thought worth the attention of more recent subscribers.

Ed.



Letters from an Unsuccessful Father to His Son

(Nos. 1 and 2 in the exhibit being his privately expressed and "for public perusal" views on "How to Attain Success").

1. (PRIVATELY EXPRESSED)

Waukegan, Illinois.

August 1, 1927

Hello Billy:

Just one hour after the time those beans in Boston woke up their *morituarari* and then relieved 'em, your estimable mother poked me in the fifth rib and insisted that I get up and write you that letter on "How to Succeed" that you are to present to the Lit. Soc. of your Coll. next Wednesday. "How" she demanded "do you expect your son to make a mark in literary circle if you don't write the things he has to present right when he asks you? You've put this thing off a week now the poor boy will hardly have time to get it copied. I'm sure you, yourself, would have been more successful if you didn't continually put off doing things till the last minute."

I murmured, "'tis true," gently insinuated that my brain never worked till there was coffee in my stomach and explained the function of the pneumogastric nerve, etc., but there was nothing doing and she was snoring before I had my pants on. You know Mother! So Bill, here I am

pounding out one of those platitudinous (and pathetic) placards which unsuccessful men (usually) prepare, to appear in two-column, leaded boxes right in the center of the page of some leading magazine. I hope, for your sake, it wins the ribbon, medal or whatever it is, but, take my word for it, you'd have done it better yourself, even if you are only a son yet. To do things is what makes you fit to be a father *nicht wahr?* Some of us,

of course, don't do much after we reach that high estate, but you and I had pretty good times doing things, didn't we? and—we "knew our groceries"!

Remember that time you told me a big kid licked you and I got you a pair of gloves and gave you lessons in the manly art down in the basement and your nose bled and you got mad and swung and loosened one of my best incisors? Remember that, Bill? Of course you also remember how thoroughly you whipped that kid the next week and how cocky you felt when your mother cried over your black eye and other marks of combat.

I've never told you exactly what she said to me about that fight. It was plenty! Women still seem to think that a man can take care of himself and them, without knowing just how to do it. They all hate a

2. (FOR PUBLIC PERUSAL)

To ATTAIN SUCCESS, my Son, you must, first of all, be superior to the ordinary run of your fellows and you must find or create the opportunity to make that superiority count.

The qualifications necessary for Superiority necessarily vary according to the field in which you seek to lead. A physically perfect violin virtuoso may, if he has to, dig a ditch, but the ditch digger cannot play the violin. Therefore, take careful stock of your natural resources. Set for your goal a point you are reasonably sure of making and then *prepare to go*.

Half the battle is in preparedness. Before you start to run, be FIT. Being that and having your goal in view, head towards it and GO THRO. To do so will call for HARD WORK, COURAGE, DETERMINATION, ADAPTABILITY, AND MAY DEMAND THE WISDOM OF THE SERPENT. Whatever the CALL on you may be, you MUST MEET IT. Not to do so is to fail.

There may be coaches on the side lines but YOU must make the play and tho' you be thrown and ground in the dirt a dozen times you must buck up and forge ahead till you win thro. The only way to score a goal is to kick it. Also, my Son, the only way to ATTAIN SUCCESS is to succeed in your undertaking. I do not choose to say more.

Your not-so-successful Father.

coward but they imagine *their* offspring can be angelic till the moment arrives for him to be strenuously human. In my opinion those of us who don't die very young have to be strenuous right from the start. That, by the way, is really one of the ways to attain SUCCESS—whatever that may be.

Do you know, Billy, that I'm not so sure today as I was when you were born that I know what SUCCESS really is? I do know that there are various brands and some of them I don't want any more than I do a bottle of "bottled in the barn" booze. The latter is more or less popular it is true and its production and sale lead, if you please, to the attainment of wealth for many, BUT is even the most successful bootlegger a SUCCESS? Personally, I prefer to be a moderately "efficient-but-poor" medico.

Remember when I stood you up on the bath-room stool and told you to look yourself right in the eyes in the glass and see if you were glad to see yourself? You couldn't do *that* every morning and night if you were getting "success" the wrong way. You'd get to hate your own face if your mind wasn't clean and clear. You may often have to sigh over some failure when you make your daily visit with yourself, but you'll never have to drop your eyes in shame if you're making a SUCCESS of life. And Billy, isn't that the main thing after all? To do the best that in you lies as opportunity offers and be able each day to shake hands heartily with what one must still term your *Soul*?

Of course I know what you'll say about the modern conception of the Soul. You may think you know its seat; you may insist that it and the mind are identical and that the mind is merely energized impressions acquired or inherited; but Bill, I know men of tremendous mentality whose souls are bleached white, and I also know individuals whose souls are so great that their minds don't cause them any great worry. They are at peace with everything.

In your strivings after SUCCESS, Billy, hang onto your Soul: you'll find it a very valuable asset when the shadows begin to gather. If, in the thick of the fight, some day you grow doubtful—not intellectually but spiritually—about "what you are and whither drifting," do again what you and I used to do so often in those good old days which come once to most of us and then

are gone forever. You and your boy may live them again (if you keep alive the soul you started with) but YOU and I cannot go back together even for one hour.

Anyhow, you slip off and climb some wooded hill when the sun is setting and sit under a tree facing West and just watch the sun go down and listen to the rustlings and whisperings of eventide. Stay there till the first stars wink out in the blue and THEN if you're not sure that you have a *soul*, something is radically wrong and you'll need heroic treatment. Don't try to analyze good things that are intangible, Bill. You KNOW they exist and if you'll just accept them you're quite likely to attain that kind of Success that means everything, when merely material things mean very little or absolutely nothing. *Too much* material gain may mean an irremediable loss. Think it over!

Perhaps I'm not the best person in the world, after all, to tell you or anyone else how to attain what is usually known as SUCCESS. I never embraced the lady, and yet for some time I ran after her like a beagle chasing a rabbit. Unlike the hound, however, I stopped to look up once in a while and the scent grew cold. Maybe I'd stay a little while to listen to the wood thrush or brown thrasher sing, and the chance to catch on was gone. I'm afraid too that I turned aside sometimes to help someone or something in distress—and so again lost my quarry. Yet each night I could look at myself, unashamed and inwardly content, and another day brought the fun of another run.

If running after Success till I grew tired of running and preferred to walk and *observe*, entitles me to give advice to those whose wind is sound and ambition high, I'll tender it. To avoid tedium and possible charges of plagiarism, I'll make it snappy. Moreover, I have an idea I hear footsteps down stairs and smell that thrice blessed aroma which arises only when *caffea Arabica* and *aqua bullientis* meet. Lately I begin to think our Mocha comes from Mexico. (There's a chance for someone to attain a *real* Success. Go down and civilize or sterilize—that darned, pestiferous prickly pot)!

To succeed fully, there or anywhere else, Billy, you must, first of all, "KNOW YOUR GROCERIES." Obviously to *know* them you must possess some sort of a stock.

That, I believe, you are supposed to be acquiring now. You'll find as you go along, however, that what you canned down as a kid will prove your best staples. Knowing your Groceries, you'll not hand out salt when sugar is called for and you won't offer soap when some sweet young thing comes along and murmurs, "Now, what is it I want?" You'll not put your fist in the scales, but you won't give eighteen ounces to the pound either. You'll give the right thing in the proper quantity and collect the money due therefor. If you don't do *that* Billy, you don't "know your groceries" and you won't make a conspicuous success. Further, you'll advertise—loudly and long, if you know your groceries intimately. No matter what you do—no matter what you have to offer, ADVERTISE. Do it nicely, Billy, but *do* it. The man who finds a new star and doesn't advertise the fact will never be referred to as a "leading astronomer."

The poet who reaches into his SOUL and the essence of things to produce winged words, which again, reach the souls of men and women even in far places, will sadly run across his work labelled "author unknown" unless he constantly advertises himself. He probably also will ultimately starve. Most poets do I think. They're such darned poor advertisers.

Therefore to recapitulate: (1) "Know your Groceries"; and (2) Advertise the fact that you *do* know 'em; then (3) Fight—as fairly as you possibly can, always, but fight anyway, wherever and whenever it becomes necessary to do so. Get what is coming to you—peacefully of course if you can, but GET IT.

Your success is gauged by what you GET, Billy, remember that. Whether, when you've got it, you find it worth having is another kettle of fish entirely. Experience and observation lead me to believe that quite often the kettle is full of very bony suckers. You and I would rather have one two-pound swift-water trout than all the suckers that ever swam, wouldn't we, boy? Any fool can catch suckers with a spear when they're running. It takes a nice hand and the right fly to land the "rainbow." Of course, in a case of dire necessity one *can*—if he choose to do so—use a worm. The trout tastes just

as good when fried with bacon, BUT when you look at yourself in the glass afterwards—? Well, you should *feel* like a worm and your Success is tainted.

There is the final thing! Look out that in *attaining* you don't *taint* yourself. It has been done and if you do it you're done too, no matter how big a man the great and glorious peepul believe you to be. You may, Bill, be almost a beggar and still be a king; you may, indeed, be almost any old thing, but, to attain the *Success* worth having, you must be able always to look yourself in the face and honestly say, "I'm all right!" Then, look your own kids in the eye and see if you're free from delusions. Pass those tests satisfactorily and you'll have attained your object, no matter what your bank balance may be. Now study the platitudinous panel attached and present it, if you choose, to your Literary Society or whatever it is. They should "Know their onions" and hand you the blue ribbon. Your mother hopes you win and so does,

YOUR OLD MAN.

A well-known Eastern appendicitis expert has a dog of which he thinks a great deal, which has a lop-sided walk. A friend asked the doctor on one occasion the cause of this.

"Why," was the reply, "he's got appendicitis."

"Then why don't you operate on him?" queried the caller.

"What, operate on that dog! Why, that dog's worth a hundred dollars."—*Sentin.*

Doctor: "Have you taken every precaution to prevent the spread of contagion in your family?"

Lady: "Absolutely, doctor. We have bought a sanitary drinking cup and we all are drinking from it."—*Pharmaceutical Advance.*

RELIGIOUS HANDICAP

Teacher: "Now, Robert, what is a niche in a church?"

Robert: "Why, it's the same as an itch anywhere else, only you can't get at it."—*Medical Pickwick.*

Thumbnail Therapeutics

ULTRAVIOLET IN MUCOUS COLITIS

Ultraviolet irradiations will cause marked improvement in 90 percent of cases of mucous colitis.

Expose the patient to the rays of the air-cooled, mercury vapor lamp, twice weekly for from 16 to 24 treatments. Begin with from 1 to 2 minutes, according to the complexion and age of the patient, and gradually increase up to 15 minutes, front and back. The distance depends upon the make, type and age of the tube and the voltage employed.—DR. LOUIS HENRY LEVY, in *Phys. Therapeutics*, Feb., 1927.

DANGERS TO ROENTGENOLOGISTS

Do not forget that roentgenology is a hazardous occupation; have in mind remote effects due to secondary and scattered radiations.—DR. M. J. HUBENY, in *Urol & Cutan. Rev.*

ELECTROLYSIS WITH BUTYN

On electrolysis of butyn, the positive ion (which is the anesthetic one) will travel to the cathode pole; hence, in practice, the active electrode, carrying the anesthetic solution, should be connected to the positive (anode) pole.—DR. E. H. VOLWILER, Chicago.

EXERCISE OR REST FOR HEADACHE

Exercise, to be beneficial, must bear relation to the frame, physiologic habit and the patient's work. Sometimes the sufferer needs a day or half day in bed with windows open, the lightest of diet and a diverting book.—LORD DAWSON OF PENN, in *Canad. M.A.J.*

MASSAGE

Massage is a form of exercise of the tissues which requires no expenditure of energy on the part of the patient. It is of great value in many disease conditions.—DR. J. C. ELSOM, Madison, Wis.

ANESTHESIA FOR NASAL INSTRUMENTATION

For eustachian catheterization and other intranasal instrumentation a solution containing 1 percent ephedrine and 2 percent

butyn is very satisfactory. It produces prompt anesthesia and shrinks the mucous membrane without changing its color. It is superior to cocaine and epinephrin for this purpose.—DR. R. REAVES, Knoxville, Tenn.

PLANTAR WARTS

Plantar warts are efficiently treated by fulguration.—DRS. J. C. ELSOM, Madison, Wis.

CHRONIC OTORRHEA

Zinc ionization will clear up 75 to 80 percent of chronic otorrheas that resist other treatment.—DR. H. W. BAU, Chicago, Ill.

DEVELOPMENT OF ULTRAVIOLET EFFECTS

After an ultraviolet irradiation, in some patients, the effect continues to develop for 24 to 72 hours, so that the erythema may be more pronounced at the end of the second or third day than it was a few hours after the treatment.

Watch for this effect before giving subsequent irradiations.—DR. GEO. B. LAKE, Chicago.

MUSTARD AND ICE WATER

If you want to get further action after a mustard plaster, wring out a cloth in ice water and apply. It feels all right for a few minutes and then doubles the effect of the mustard.—*Compend of Med. & Surg.*

ARTIFICIAL SUNLIGHT IN GLAND TUBERCULOSIS

Where clear and direct sunshine is not available, general exposure of the body to the rays of therapeutic lamps is almost as effective, in cases of glandular tuberculosis as the sun's rays themselves.—DR. A. VON BOUSDORFF, in *Tubercle*, Oct. 1926.

X-RAYS IN GOITER

Treatment with x-rays is excellent in exophthalmic goiter. It has no hazards, offers the patient a great financial saving and gives good results in about 80 percent of cases.—DR. M. J. HUBENY, in *Urol. & Cutan. Rev.*

ULTRAVIOLET RADIATIONS

It is best to let a mercury vapor lamp run for 10 to 20 minutes before beginning to treat a patient, in order to let its radiating power build up. All the various types of rays are emitted as soon as the lamp is started, but they are weak, at first.—DR. HERMAN, of New York, at A.M.A. meeting.

MASSAGE

Massage may be helpful in maintaining a sense of well-being and muscular and circulatory tone in bedridden or crippled cardiac patients. It is a method of treatment that is used too little. It is especially helpful in local disturbances of muscles, joints and the circulation.—DR. PAUL D. WHITE, in *J.A.M.A.*, Aug. 6, 1927.

LARGE DOSES OF CALCIDIN

The average physician is too timid in giving calcidin. The best results follow the use of large doses. Infants should receive 1 grain, three or four times a day or oftener, if required; children of 5 to 10 years, 2½ grains; and adults, 5 to 10 grains, at similar intervals. The drug is given for the lime it contains, as well as for the iodine.—DR. HARRY S. GARRETT, Park Ridge, N. J.

PYRETIC TREATMENT OF ARTHRITIS

During the past three years 78 cases of chronic arthritis have been treated by the so-called "pyretic treatment" and all but six admitted a definite relief.

The pyretic treatment is best accomplished by daily, low-pressure steam sweats given in a cabinet where the temperature can be accurately controlled so that there will be maximum elimination with minimum depletion of the patient. It is combined with means for improving elimination through the skin, kidney and bowels; and all possible sources of infection are removed.—DR. H. J. WYCKOFF, in *Northwest Med.*, Feb., 1927.

DIATHERMY FOR PLEURAL PAIN

Diathermy treatment has a most happy effect in diminishing the pleural pain which is commonly present in pneumonia.—DR. V. P. SYNDENSTRICKER, in *J. S. Carolina M. A.*

VACCINES IN GONORRHEA

Cases of gonorrhea, treated with large doses of gonococcic vaccines, run a severe and protracted course; but very small doses of these vaccines are helpful at certain stages of the disease. DRS. PELOUSE and SCHOFIELD, in *J. of Urology*.

SPONGE PACKS IN OZENA

If a piece of red rubber bath sponge the size of an almond is placed in the anterior nares for an hour after rising and before going to bed, and this is followed by a saline irrigation to remove scabs and secretions, the distressing symptoms of ozena will be ameliorated within a week. This treatment must be continued indefinitely, as it seems to be wholly palliative, but it is harmless, cheap and effective.—DRS. FREUDENFALL and STEIN, in *Laryngoscope*.

SODIUM BARBITAL BEFORE LOCAL ANESTHESIA

In 100 patients who received 6 to 12 grains (according to age and weight) of sodium barbital, by mouth, ½ to 1 hour before beginning local anesthesia, no undesirable symptoms appeared; whereas, formerly, such symptoms were rather common.

If symptoms have developed, give the same drug intravenously, in carefully adjusted dosage, at once.—DR. JOHN LESHURE, in *J.A.M.A.*, Jan. 15, 1927.

PROPHYLAXIS OF COCAINE POISONING

Beck and Pollack report that 3 grains of luminal (phenobarbital), given 30 minutes before beginning a local anesthesia where cocaine is to be used, does away with all toxic symptoms of the latter drug. It is also useful in treating toxic symptoms when they have appeared.—DR. M. R. GUTTMAN, in *Arch. Oto-Laryngol.*

Current Medical Literature

ANTIRACHITIC PROPERTIES OF HUMAN MILK AFTER IRRADIATING THE MOTHER

Ultraviolet rays, from whatever source, have been proved to be an efficient protection against rickets, when the subject is irradiated directly, and it has been shown that milk so irradiated has a similar effect, but there has been a question as to whether irradiation of a lactating woman would confer antirachitic properties upon her milk, though Steenbock and Hart demonstrated that this occurs in the case of irradiated goats.

Rickets is less common among breast-fed than among bottle-fed infants, but from one-third to one-half of the former develop this condition, in north-temperate latitudes. It would therefore be of value to increase the antirachitic power of mothers' milk.

In order to determine the answer to this problem, Dr. A. F. Hess and his coworkers carried out some interesting experiments and reported the results in *J.A.M.A.*, January, 1, 1927. Young rats were fed on a rickets-producing diet until they developed definite signs of this disease. They were then given 25 cc. of human milk, from a non-irradiated woman, daily for 9 days. No improvement was noted.

The woman was then irradiated with a mercury vapor lamp, at a distance of 60 inches, for periods of 50 minutes every other day for one month, after which her milk was again collected and fed to rats under precisely the same conditions as before. The results were surprising. All animals receiving this milk showed prompt and marked improvement. In several the bones became normal in appearance. The inorganic phosphorus in the blood increased from 1.98 mgm. to 5.61 mgm. per 100 cc.

The antirachitic properties of this milk were not due to its high phosphorus content (the percentage was slightly below normal) but to a definite increase in its non-saponifiable, antirachitic factor.

Lactating animals show a definite decrease in their blood-calcium; but ultraviolet irradiation tends to stabilize the salt equilibrium. Orr and his coworkers showed that exposure to the rays of a carbon arc lamp markedly reduced the loss of calcium in lactating goats.

Natural sunshine has a powerful effect in preventing rickets, but in these milk experiments it is decidedly inferior to the artificial sources of ultraviolet energy, because such sources give off a much higher percentage of the short, chemical rays.

These experiments appear to be of direct, practical value in pediatrics, obstetrics and

perhaps in dentistry and suggest the advisability of irradiating mothers, during lactation, as a means of protecting their children from rickets and maintaining their own nutrition, especially the integrity of tissues which store calcium and phosphorus—the bones and teeth.

DIATHERMY FOR COMMON COLDS

Dr. H. Bordier, in the *Paris Méd.*, June 11, 1927, describes an apparatus for diathermy treatment of common colds.

The apparatus consists of two metal plates, 1 mm. in thickness, of a size and shape to fit on the two sides of the nose, fixed to the arms of a V, made of an insulating substance, a joint at the base of which permits adjustment to any type of nose. A terminal on each plate receives the wires and a rubber band round the head immobilizes the apparatus when in place. With the patient seated, the amount of current is increased until he feels a sharp sensation of heat within the nose. This sensation becomes painful according to degree of mucosal disease and cure of coryza occurs when the patient can no longer bear the treatment.

Dr. Bordier claims that a single sitting generally suffices to cure a cold, but two or three sittings are better. His apparatus is an improvement on the original instrument devised by Dr. Tsinoukas, of Greece.

PHYSIOLOGIC EFFECTS OF HEAT

There are those who seem to feel that anyone is competent to direct and apply heat treatment to patients, but the studies of Dr. Ralph Pemberton, of Philadelphia, reported in *Ann. Clin. Med.* for February, 1927, indicate that the physiologic effects of external heat are such that it needs to be used always under the direction of a qualified physician.

Heat produces sweating, but the only substances eliminated with any regularity and certainty are water and sodium chloride, though urea, ammonia, creatinin and other materials sometimes appear in the sweat in small quantities.

The pulse rate rises in proportion to the increase in body temperature, as it does in fever (about 10 beats for each 1°F.). The effect on blood-pressure varies greatly, though in a general way, hot baths tend to lower the pressure and cold ones to raise it. This, however, depends upon the temperature and duration of the exposure to heat, as well as a number of other factors.

If the body is immersed in hot water, diuresis, with increase of urea and chlor-

ides, takes place, provided the abdomen is covered. This does not occur if only the limbs are in the bath, and little if at all following exposure to dry hot air.

The depth and frequency of respiration are increased, with augmented excretion of water and carbon dioxide by the lungs, especially when the hot water bath is used. The rapid loss of CO_2 through the lungs, urine and sweat, may result in systemic alkalosis, the reaction of the blood changing, sometimes, from pH 7.26 to 7.65. "Elimination" by means of external heat should be conducted carefully and with judgment, furnishing the patient with plenty of water internally so that dehydration may not take place.

If heat is pushed beyond the initial stages, symptoms such as dyspnea, giddiness, tingling, pulsation in the extremities, mental irritability, confusion or even tetany may appear. These are less noticed if the patient is in the prone position. With repeated exposures to heat a tolerance seems to be acquired.

The exposure of parts of the body to the effects of heat produces results differing from these only in degree.

ULTRAVIOLET IN EAR, NOSE AND THROAT CONDITIONS

The marked increase in respiratory diseases during the winter may possibly be due, in part at least, to the fact that the ultraviolet radiations from the sun reach us much less effectively during the cold and gloomy months, in the opinion of Dr. E. N. Kime, of Indianapolis, writing in *J. Ind. St. M. A.* for March, 1927.

While ultraviolet rays should never be considered the whole treatment for diseases of the ear, nose and throat, it is certain that they are valuable adjuncts to such treatment. The rays from the water-cooled quartz lamp are applied locally, and general body irradiations are given with the air-cooled lamp.

Neither the rhino-laryngologist nor the physical therapist can, as a rule, handle these cases adequately alone. The former lacks the time and apparatus necessary to give physical treatments; and the latter lacks the knowledge and technic necessary to diagnose upper respiratory conditions.

Best results are obtained by the cooperation of the internist, the physical therapist and the otolaryngologist. In this way constitutional factors can receive adequate attention, necessary surgical intervention can be carried out and the indicated physical agencies be applied.

In using local ultraviolet treatments in the nose and throat, drainage and ventilation must first be secured, by surgery if necessary; all crusts and mucus must be removed from the surfaces to be treated; the quartz applicators must be pressed firmly against the mucous membrane, in order to drive out the blood as much as possible; and heavy doses of radiation should be given in the nose. The mucosa

of the soft palate is very sensitive and should be rayed for not more than 2 or 3 minutes at the first sitting.

Ultraviolet rays are not harmless and must be used with great caution in persons who are sensitive to light; in those who respond violently to foreign proteins; and in those whose metabolism is already overstimulated, as in cases of active pulmonary tuberculosis and toxic goiter.

ERYTHEMA FROM ULTRAVIOLET

A series of careful experiments has been conducted by Marion G. Smith regarding the rays which are capable of producing erythema and the results are reported in the *Am. J. Phys. Therap.* for January, 1927.

Smith finds that all wave lengths shorter than 3022 Angstrom units are stopped by ordinary window glass, and that, while a 30-second exposure to a water-cooled quartz lamp, operating at 75 volts, at a distance of 10 cm., produced a marked erythema, the interposition of a pane of window glass inhibited the production of erythema, even though the exposure was increased 15 times.

A filter which cut off wave lengths below 2894 did not interfere with the production of erythema. This shows that the rays which produce erythema are shorter than 3022 Angstrom units, and therefore are in the same region as the rays which benefit rickets and other diseases and not among the longer rays which are able to penetrate more deeply, so as to be absorbed by the blood.

This observation shows the basis for the common observation that the therapeutic power of ultraviolet radiations is, in most cases, closely correlated with their ability to produce erythema.

It is quite probable that wave lengths longer than 3022 are able to produce some therapeutic effects, but we do not yet know what these may be.

MECHANICAL VIBRATION

Dr. William J. Tindall, in *Reprint No. 563* of the Victor X-Ray Corp., declares that the mechanical vibrator is an important piece of physical therapy apparatus, which is largely overlooked by physicians, at present, perhaps because the various irregular cults base their treatment largely upon massage and manipulation of the body.

The principal uses of the vibrator are for local stimulation, inhibition or sedation, massage and diagnosis. Stimulation is produced by a medium stroke and light pressure, the impulse being of a short duration, five to ten seconds; whereas for inhibition or sedative treatment the application is given with a heavier pressure and is prolonged from fifteen to twenty seconds even up to several minutes in certain conditions. For diagnosis, examination with the vibrator better enables the physician to locate sensitive areas, particularly along the spine, and the various organs of the body,

than by manual palpation, and suggests to the examiner conditions which might otherwise escape attention.

Treatment by mechanical vibration has been found by clinical experience to be capable of:

- 1.—Increasing the volume of the blood and lymph flow to a given area or organ.
- 2.—Increasing nutrition.
- 3.—Improving the respiratory process and functions.
- 4.—Improving muscular and general metabolism, and increasing the production of animal heat.
- 5.—Stimulating the excretory organs and assisting the functions of elimination.
- 6.—Stimulating secretion.
- 7.—Softening and relieving muscular contractures.
- 8.—Relieving engorgement and congestion.
- 9.—Facilitating the removal, through the natural channels of the lymphatics, of tumors, exudates and other products of inflammation.
- 10.—Inhibiting and relieving pain.

It is scarcely necessary perhaps, to say that treatment by mechanical vibration is not claimed to be a cure-all any more than any other physical therapy treatment, but for the purpose of effecting the changes above enumerated, there are no physical therapeutic methods that will render so effective service along these lines, with as few disappointments, as mechanical vibration properly employed. The treatment is rational and scientific, for the simple reason that it is in accord with sound physiologic principles.

All cases of constipation will usually require treatment over the pneumogastric for the purpose of stimulating peristalsis, and over the splanchnic area for its nutritional effect, then over the abdomen, with moderate pressure—following the course of the colon—up the ascending, across the transverse, and down the descending colon, and particularly over the sigmoid flexure where the nerves are proverbially inactive.

In neurasthenia and melancholia, where excessive fatigue is a prominent feature, stimulation over the splanchnic region, especially between the processes of the second and third, third and fourth, fourth and fifth and fifth and sixth dorsal vertebrae, for five to ten seconds, will be found to afford great relief. The treatment should last about five minutes. In weak hearts and in hearts that interrupt, applications are made between the lateral processes of the seventh cervical and first dorsal vertebrae for two minutes. This treatment produces contraction of the muscles of the heart, increasing its force and tone. In insomnia, nervousness and other conditions of the nervous system, applications made over the cervical and as low down as the eighth dorsal will afford great relief.

Other therapeutic applications will be suggested by the physiologic effects just mentioned.

The technic of vibration therapy is not difficult to learn and when it has been learned and applied, physicians will find that this agency will prove helpful in many conditions.

ULTRAVIOLET RAYS IN DENTISTRY

In the *Bul. Chicago Dent. Soc.* for October 29, 1926, Dr. Lewis A. Platts, of Chicago, reports a severe case of ulcerative gingivitis in a woman of 30 years. The gum tissue was highly inflamed, swollen, sloughing and painful.

The teeth were wiped as clean as possible with sterile cotton and ultraviolet irradiations used for 30 seconds. The exposure was increased by 30 seconds each day. On the fifth day the mouth was fairly normal and comfortable. No drugs were used. No recurrence during 2½ years.

Ultraviolet rays are decidedly analgesic when used in the mouth and are of marked value for postoperative treatment and in cases of ulcerative gingivitis and pyorrhea alveolaris.

USES OF ULTRAVIOLET THERAPY

In the *N. Y. State J. of M.* for October, 1926, Dr. Alfred F. Hess declares that ultraviolet rays, from whatever source, are a specific for the prevention and cure of rickets and tetany. The mercury vapor or carbon arc lamp may be used with equal success and each possesses certain advantages.

Irradiations are of the highest value in tuberculosis of the peritoneum and are frequently very helpful in bone, joint and gland and selected cases of pulmonary tuberculosis.

Ultraviolet therapy is being successfully used to prevent the development of colds and influenza, but seems to exert no effect against whooping cough and chicken pox. It is also of value in pus infections of the skin (furuncles, etc.), but not in eczema.

The effect in rickets is due largely to the activation of the cholesterol in the skin.

The author recommends that colored glasses be worn when one is exposed to ultraviolet rays, to prevent the appearance of a more or less severe conjunctivitis.

INDUSTRIAL PHYSICAL THERAPY

The genesis of modern physical therapy was brought about by the need to minimize the disabilities resulting from battle wounds which occurred during the War, and as industry produces many casualties, the same procedures are valuable in time of peace.

In *Archiv. Phys. Therap. X-Ray & Rad.* for January, 1927, Dr. John S. Coulter, of Chicago, discusses the uses of physical therapy in industrial surgery. He classes this work as preventive and curative; The former applied as soon as possible after the injury, so as to minimize the resulting disability; and the latter used at any stage to ameliorate

iorate the patient's condition. He heartily recommends the wider use of preventive measures.

The equipment for this sort of work may be as cheap or as expensive as one desires. A whirlpool bath and various pieces of apparatus for mechanotherapy can be made by any ingenious plumber and carpenter if the surgeon will give him the ideas.

For muscle stimulation nothing is better than the sinusoidal current. If one does not care to buy one of the excellent machines for delivering this current, it is possible to construct one that will work fairly well. There are, however, very definite limits to the possibilities of physical therapy with home-made apparatus, and the physician should guard against giving patients nothing for something.

The modern physical therapy clinic should be prepared to use electrotherapy, hydrotherapy, thermotherapy, actinotherapy, therapeutic exercise and remedial gymnastics.

For strains of the muscles and ligaments the best treatment is radiant heat from an incandescent lamp of 1,000 or 1,500 watts capacity, followed by direct diathermy, using 1,800 to 2,400 milliamperes for 30 to 45 minutes; the treatments to be given daily and later supplemented by very gentle massage.

In sprains the same treatment is useful, but light massage should be begun earlier. The average diathermy milliamperage for the various joints is: fingers and toes, 200 to 300 ma.; ankles and wrists, 500 to 750 ma.; knee, 1,200 to 1,400; elbow, 800 to 1,200; shoulders and hips, 1,200 to 1,800 ma.

After dislocations, gentle massage and motion should be begun immediately after reduction, under the careful supervision of the surgeon. Shoulder injuries should be treated in 90° abduction and external rotation, with passive and active motion begun early. Radiant heat, sinusoidal current and massage are helpful.

Ankylosis of joints, frequently follows prolonged immobilization and should be treated by radiant heat and light, the whirlpool bath and diathermy, followed by massage and passive motion. The muscles should be stimulated by the sinusoidal current. Mechanotherapy, medical gymnastics and curative occupational therapy assist greatly. Records should be kept of the progress obtained in the force and amplitude of the motions of the affected limb.

Fractures may be treated by complete immobilization, in a cast, or by relative immobilization with the Thomas splint and traction. In most cases the latter method is to be preferred, as physical therapy treatments can be begun earlier and will shorten and decrease the disability.

Ulcers of various types are best treated with the air-cooled ultraviolet lamp, beginning with 2 minutes at 40 inches and gradually increasing the time and decreasing the distance. The same agency can be used for general body irradiations in spondylitis deformans, with good effect.

If physical therapy is not used on patients of this type they will seek the aid of osteopaths and chiropractors, but we must be careful that we know more about what we are doing than do these gentry. We must examine and study each patient, fully and carefully and must understand the indications and limitations of the agencies we are using, otherwise the reputation of physical therapy will suffer as well as our own.

CURATIVE EFFECT OF IRRADIATED FOOD

Drs. O. Gotteche and M. Talnai have made some interesting clinical observations upon the management of rachitic infants, which are reported in *Jahrbuch für Kinderheilkunde* for October, 1926.

They chose only cases with positive, objective signs of rickets—x-ray appearances and blood-phosphorous findings—and fed them with various foods which had been subjected to ultraviolet irradiations. They feel that the food used makes little difference, and that 600 Gm. of buttermilk, 300 Gm. of albuminous milk or 140 Gm. of unsweetened, whole milk, irradiated for one hour at a distance of 33 cm., is equally able to cure rickets in an infant fed with it.

Quantities of irradiated milk similar to the doses of cod-liver oil (a few teaspoonfuls) given to these patients do not cure them. It requires more—somewhere between 15 and 140 Gm. Experiments show that irradiated cane sugar and white flour have little or no effect. Irradiated cholesterol and plasmon (casein and salts of milk) seem to give the largest result.

The right type of patients—those without gastrointestinal disorders—and the right season should be chosen for this form of treatment, and the infant should remain in the hospital for at least 6 weeks. These clinical cases are more convincing and satisfactory than experiments on rats, but take longer to demonstrate.

PHYSICAL THERAPY IN ARTHRITIS

Arthritis is such a protean condition and is due to such a variety of causes that its treatment requires much individual study of the patients.

There are, however, certain general measures which are useful in most cases, and these are outlined by Dr. William Martin, of Atlantic City, N. J., in *Western M. Times* for March, 1927.

Infective foci should be removed; the hypochlorhydria which is usually present should be corrected by diet and the administration of HCl; intestinal irrigations are of value, and so is the implantation of acidophilus bacilli.

Autocondensation, using 300 to 400 milliamperes of current, reduces the nitrogenous compounds in the blood and increases the output of the kidneys, including nitrogen and sulphur.

The many cases which show low general vitality respond wonderfully to *ultraviolet irradiations*, if given in the proper dosage.

Local treatment depends upon the joint or joints affected, but *diathermy* is generally very helpful, either through the joint or by the cuff method. If the cross fire method is used we must give moderate doses for short periods, so as not to relax the joint. Where practicable, the antero-posterior placing of the electrodes will obviate this danger. Silver mesh electrodes will help to obtain mechanical contact in difficult cases.

The diathermy treatment may well be followed by sparkling, using long sparks for large joints and short ones for the fingers, avoiding the finger tips on account of their sensitiveness.

ULTRAVIOLET RAYS FOR BALDNESS

An editorial in *L'Indépendance Médicale* for April 16, 1927, calls attention to the fact that the use of ultraviolet irradiations as a treatment for baldness is frequently overlooked.

Of course, it is impossible, by this or any other means, to restore hair on a head where all the hair follicles have been destroyed, but results may be obtained in cases of *seborrhea* where the hair is almost or completely absent, the remaining hairs being lifeless and showing little or no growth.

In order to obtain results it is necessary to produce a very strong erythema of the scalp. This is done by exposing the head (covering the other parts of the body) to the air-cooled lamp, at a distance of 30 to 40 cm., for about 15 minutes.

The treatments are given twice a week for one month and once a week for another month. These courses of treatment can be repeated from time to time if the malady shows any tendency to return.

DOSAGE IN LIGHT TREATMENTS

According to Dr. Albert Eidinow, writing in the *Lancet* (Lond.) for Sept. 25, 1926, when the skin is exposed to ultraviolet rays shorter than 3,100 Angstrom units the degree of erythema depends upon: (1) the distance of the lamp from the skin; (2) the temperature of the skin; (3) the intensity of the rays (judged by the kilowatts of energy expended); and (4) the patient's sensitiveness to the rays.

Exposures of the chest and back to a mercury-vapor arc lamp, sufficient to cause erythema, often increase the bactericidal power of the blood.

From a number of carefully conducted animal experiments it seems reasonable to conclude:

1.—That an "erythema" dose of ultraviolet is necessary to increase the bactericidal power of the blood.

2.—That exposure of a skin area corresponding to 20 to 50 sq. cm. per kilogram of body weight produces the best results.

3.—That exposures longer than are necessary to produce erythema do not add to the therapeutic value of the treatment, unless the area exposed is small.

4.—That the factors which influence the bactericidal power of the blood are the area of skin exposed and the intensity of the erythema produced.

The method employed is to divide the body into 4 areas: Back, chest, front of legs, back of legs. One of these areas is exposed, in rotation, three times a week, giving just enough radiation to produce erythema. Thus each area has a rest of 9 or 10 days between exposures so that it completely recovers from the last treatment. In this way the skin remains sensitive to small doses of the rays. The skin of any area is rested until it appears to be perfectly normal. If pigmentation develops the dosage is increased or the carbon lamp is used.

An advantage of this method is that biologic effects continue to be produced by short exposures. Even after 30 to 40 treatments an erythema will be produced by an exposure for 10 minutes.

LIGHT SENSITIZATION CAUSING DERMATOSES

The use of ultraviolet irradiation has been enormously increased of late and it is being applied in all sorts of ailments.

Dr. Sigmund S. Greenbaum, of Philadelphia, in *Am. J. Dis. Child.*, July, 1927, points to some of the cutaneous reactions of ultraviolet rays which may be either of congenital or acquired origin.

The author illustrates several types of personal cutaneous susceptibilities to ultraviolet irradiation.

With the exception of hematuria there are no diagnostic signs of the presence of a potential light sensitization in very young children. When ultraviolet therapy is to be administered to infants, testing doses to determine tolerance or sensitivity are therefore advisable. In the older children a recurrent summer eruption on exposed surfaces should be viewed with suspicion.

These conditions suggest the possible dangers connected with the indiscriminate use of actinotherapy by unqualified persons.

ROENTGEN RAY ANALGESIA

That roentgen rays have a definite analgesic action is not generally known. Dr. A. U. Desjardins, of the Mayo Clinic, in *Radiology*, April, 1927, says that studies on this aspect of radiology have been meager and the literature, at least up to recently, rather scant.

The analgesic property of roentgen rays is a matter of daily observation in the radiotherapy of benign and malignant tumors. But analgesia is not always obtained

and it cannot yet be determined definitely, beforehand, which cases are likely to derive benefit. It is, however, possible to lay down some broad generalizations. For example; pain due to the pressure exerted by a tumor on nearby nerves is commonly relieved by adequate irradiation of the region occupied by the tumor. Pain due to pressure on or irritation of nerve roots by contiguous metastatic foci is usually controlled by irradiation. Such control may be permanent or only temporary, and thus does not seem to be dependent on the subsequent behavior of the neoplastic process.

Reports of 7 cases occurring at the Mayo Clinic are given in which the roentgen rays exercised a definite analgesic effect.

In regard to the mechanism by which the rays produce analgesia, Desjardins thinks that there is some reason to believe that the relief is due to the release of sensory nerves from pressure by a tumor. But analgesia is also produced by the rays in many conditions besides tumor and it may be that they have a true specific action on nerve cells themselves.

Whatever may be the mechanism by which roentgen-rays abolish pain in many conditions, Desjardins says there can be no doubt that they do possess a definite analgesic property.

PHYSICAL THERAPY AND THE ENDOCRINES

There are several points of contact between disease conditions of the endocrine glands and physical therapy, according to Dr. Maximilian Kern, of Chicago, in *Arch. Phys. Therap., X-Ray, Rad.*, April, 1927.

X-ray pictures of the sella turcica, in a very large number of cases, reveal some pathologic condition of the pituitary gland. When the gland is clinically hyperfunctioning there is no known treatment other than physical therapy. Dr. Kern mentions a personal case of pituitary blindness cured by a combination of endocrine treatment with x-ray and ultraviolet radiations.

Dr. Kern's remarks in connection with fixation of body calcium by the conjoint action of parathyroid extract and ultraviolet irradiation are important, viewed in the light of recent developments as reported in the literature.

Regarding the thyroid, he thinks that there is danger in the use of the x-ray in the treatment of goiter, particularly of the toxic type, unless controlled by constant basal metabolism tests.

Stimulation or depression of the ovaries by means of x-rays is decidedly empirical, at present. As a matter of fact, ovarian

disturbances rarely involve those glands alone but affect the whole endocrine chain. Much can be done, in many of these cases, by hydrotherapy, massage and diet.

Dr. Kern warns of the danger connected with the too-promiscuous use of thyroid extracts in the many "reduction" treatments now in vogue. The indiscriminate use of thyroid extract, by those who are either ignorant of or oblivious to its dangers, is much to be deplored and is harming both endocrinologists and physical therapists.

WORK OF THE PHYSICAL THERAPISTS

In *Am. Med.* for June, 1927, Dr. Geo. B. Lake, of Chicago, declares his belief that the men who are speaking and writing on the various physical methods of treating disease are doing a type of scientific work which compares favorably with that accomplished in other fields; and their lectures and papers average higher in practical value than those along general lines of medicine and surgery.

Somebody has to finance the basic investigations in any line. For general medical science we have the Rockefeller and the Mayo foundations and other institutions. These looked down upon physical therapy or had no time to investigate its fundamentals.

The manufacturers of apparatus financed the studies which are rapidly making physical agencies in medicine highly scientific. They are making money out of it, but their results are no less valid.

Every physician should be a *clinical* researcher, every day, recording the tests he makes and the results he obtains and publishing his findings in due time.

The Council on Physical Therapy, of the A.M.A. is a long step toward putting this branch of therapeutics in the sound and ethical position where it rightfully belongs.

ULTRAVIOLET IRRADIATION OF EYES

Dr. W. S. Duke-Elder, in *Brit. M.J.*, May 29, 1926, says that the eye diseases most amenable to actinotherapy are those of a chronic inflammatory type. The ultraviolet irradiation should be general, in the form of baths. Ocular tuberculosis, iridocyclitis, ophthalmitis and choroiditis are benefited.

Local irradiation gave good results in chronic blepharitis, catarrhal conjunctivitis, corneal ulcers and phlyctenular keratitis.

New Books

LENK-CANDY: X-RAY THERAPY

INDEX AND HANDBOOK OF X-RAY THERAPY. By Dr. Robert Lenk, Privat-Dozent of Medical Roentgenology, University of Vienna. With a Foreword by Professor Holzknecht. Translated by T. I. Candy, M.B., B.Ch., D.M.R.E., Hon. Radiologist, Royal Gwent Hospital, Newport, Mon. London, New York, etc.: Humphrey Milford, Oxford University Press. 1926. Price \$2.25.

This concise volume of little more than 100 pages is a translation of the work by Dr. Robert Lenk, one of the assistants to Professor Holzknecht, of Vienna, who is the foremost German authority on radiology. The first nineteen pages is a general exposition of the action of the x-rays, and the second or major portion of the book is devoted to the special therapeutic applications of the rays. This part enumerates the conditions in which x-ray therapy is considered suitable, which are arranged in alphabetical order. The text under each heading gives a succinct account of the mode of action, the prognosis, sequellæ, and adjuvant treatment as well as the radiologic formula.

The book appears to us too technical for the general practitioner; besides, past general experience does not seem to warrant (at least up to the present time) any attempt to standardize x-ray treatment of disease and this is what must be accepted as the purpose of the book in laying down general formulæ for the treatment of each disease, apart from the fact that the value of x-ray therapy is dubious in many of the conditions mentioned, such as malaria and nephritis.

There are too many permutations and combinations between patients and diseases and general formulæ cannot be applied to all.

The book may be of value to the radiologist but we fancy that its conciseness may be too great judged from this view.

W. A. B.

BUCKY: PRACTICAL DIATHERMY

ANLEITUNG ZUR DIATHERMIEBEHANDLUNG. Von Dr. G. Bucky, New York. Second Revised Edition. With 132 Illustrations. Berlin, N 24, Friedrichstr. 105 b: Urban und Schwarzenberg. 1927. Price, 6 Marks.

Those interested in Diathermy who can read technical German should not fail to peruse this excellent little manual, for it will open to them avenues of information which cannot be obtained in similar American monographs. While in principle the indications and contraindications for dia-

thermy, both medical and surgical, presented by Bucky are virtually identical with the teachings of American physiotherapists, the presentation of the diverse problems varies both in method of presentation and in arrangement of the subject.

The author, who is a recognized German authority, now practicing in New York, restricts his theoretic and practical expositions in accord with the needs of the everyday practitioner.

Bucky describes and illustrates the German apparatus and appliances and as these differ somewhat from the American models, they are naturally of interest to us. His strong plea for dry electrodes is based on sound theory and supported by favorable practical experiences on a wealth of clinical material. The brief section on "labile" and "stable" diathermization is clear, the author preferring the stabile method for deep work and the labile method for surface action.

The illustrations are excellent.

As the title indicates this is not a treatise but a practical manual, and as such the monograph meets all scientific and practical requirements.

A bibliography of no less than twenty-five pages, enables those who desire to follow the investigations in diathermy throughout the civilized world to find the sources without effort. All in all, this is doubtless an exceedingly useful work on practical diathermy.

G. M. B.

ROLLIER: HELIOTHERAPY

HELIOTHERAPY. With Special Consideration of Surgical Tuberculosis. By A. Rollier, M.D. Translated by G. de Swietochowski, M.D., M.R.C.S. Second Edition. London, New York, etc.: Humphrey Milford, Oxford University Press. 1927. Price \$6.25.

Rollier's name is synonymous with the sun treatment of tuberculosis. This is the second edition of his authoritative exposition of the Leysin method of heliotherapy, the first edition having appeared in 1923. The English translation is by Dr. G. de Swietochowski.

A clear description of the scientific aspects of heliotherapy is given, together with the technic, dosage, radiologic control, results, etc. These matters, which were at first necessarily empirical, have now, owing to accumulated experience, been more or less formulated.

Complete details of the treatment are given, from the arrival of the patient at Leysin. The patient is first acclimatized

to the high Alpine climate and heliotherapy is inaugurated with exposures of five minutes each, increasing to a maximum of three to four hours in winter and two to three hours in summer.

As might be expected, surgical tuberculosis receives very special attention. Orthopedic measures are always combined with heliotherapy when indicated and the case is always under radiologic control. Rollier evidently does not believe much in substitutes for the sun, and artificial sunlight is not employed to any great extent at Leysin; yet the value of both the ultraviolet and x-rays as supplementary aids is fully recognized.

The value of diet and work is also appreciated. Schools for children, and manual and other occupations for adults have been organized.

The results obtained are tabulated in general statistical tables; cases of the same kind have been grouped together in this way and individual case reports omitted.

A feature of the book is the wealth of clear illustrations; an extensive bibliography of references is also given at the end.

The volume is on the whole, an excellent and comprehensive exposition of the possibilities of phototherapy and should prove of great interest to every practitioner of medicine.

W. A. B.

PARENTERAL MEDICATION

MANUAL OF PARENTERAL MEDICATION
Chicago: The Cook Laboratories. 1927.
Price 50 cents.

Although this is a commercial booklet showing the drugs and methods in connection with the hypodermic and intravenous injections by the "Carpule" system, the little pocket manual is so scientific in character that we recommend it heartily to all who desire ease and speed, as well as precision, in the treatment of a number of diseases by drugs.

The little booklet opens with a brief history of parenteral medication, discusses its safety, describes the technics, and includes also brief sections on the injection of hemorrhoids and tonsils. A therapeutic index is well prepared. The bulk of the book is devoted to pharmacologic notes.

There is no denying that whoever wrote the book—the author's name not being given—is evidently a physician who knows medicine, and is familiar with the needs of the internist. The text is ethical throughout and well prepared. The illustrations actually illustrate. Every physician should have this little work on his desk for frequent reference.

A. S. E.

WOOD: INTUITION OF WILL

THE INTUITION OF THE WILL. By Ernest Wood, Author of *Concentration, The Seven Rays, etc.* Chicago, 826 Oakdale Ave.: The Theosophical Press. 1927. Price \$1.50.

Few people stop to think what the word, intuition, means, etymologically. Intuition is the process of gaining or imparting something from the outside, with the help of exterior agencies. The wisdom, compassion and will which are ours by virtue of the light and power which are within us may be said to be intuitive, because we possess them *without tuition*.

The author says that the three fundamental necessities of man may be summed up in the expressions: "I want the world;" "I want you"; and "I want to get somewhere."

He discusses the intuition of wisdom (by means of which we suddenly come into possession of knowledge, almost in a flash), the intuition of love (whereby we feel an abiding and powerful attraction to certain people, entirely apart from our reasoning processes), and then goes on to expound the process by which we *will*, from the inside out, and not in obedience to external pressures.

Definite rules are given for the training and development of the intuitive faculties and for freeing ourselves from the slavery of ignorance, dogma and superstition. The state of freedom from such bondage is outlined.

Wood has the unusual faculty of presenting ideas which are outside the range of the ordinary thinker in simple, logical and entertaining language. His illustrations are drawn from the common experiences of daily life and his conclusions are reached by such clear and obvious steps that it is easy to follow his argument and hard to escape his meaning.

Any person who desires to increase and develop his inner powers and faculties needs this book as a practical working manual. Any thinker will enjoy it, whether he agrees with the author or not.

REDDING: X-RAY DIAGNOSIS

X-RAY DIAGNOSIS. A Manual for Surgeons, Practitioners, and Students. By J. Magnus Redding, F.R.C.S., Senior Surgical Radiologist to Guy's Hospital. With 80 Skiagraphic Plates. New York: William Wood and Company. 1927. Price \$7.00.

This book is intended for surgeons, practitioners and students rather than for radiologists. The technic of radiology is therefore only very briefly described when necessary.

It is a practical guide for the interpretation of roentgenograms of pathologic conditions and as such appears to fulfill its purpose excellently. The descriptions of the lesions affecting the different anatomical systems are preceded in every instance by an analysis of the appearances produced by the normal structure and of the modifications in those appearances which result from disease. This is an excellent feature which will appeal to the general practitioner and surgeon who have not made a special study of radiology. The rarer lesions

are either omitted or are dealt with very briefly.

The book itself is short and text descriptions are concise; much of the space is therefore allotted to illustrations, there being 80 plates, most of which contain several figures.

As might be expected, the greater part is devoted to pathologic conditions of the bony skeleton and abdomen.

The book is recommended for the purpose aimed at by the author.

W. A. B.

STONE: PHALLICISM

THE STORY OF PHALLICISM. By Lee Alexander Stone, M.D., *With Other Essays on Related Subjects by Eminent Authorities. Introduction by Frederick Starr. In Two Volumes.* Chicago: Pascal Covici, 1927. Price \$15.00.

The worship of the generative organs, as symbols of the creative power of the Diety, goes back to the very dawn of history and is inextricably interwoven with all religious ceremonials, even to the present day.

Many books on phallic worship have been written. Some are scholarly treatises making interesting additions to the sum of human knowledge; some, while containing material of historical value, have gone so fully into the details of the ceremonials in use in bygone days that they have stimulated the imaginations of the prurient-minded; some have merely used the cloak of science to cover the publication of pornographic volumes of unspeakable lewdness, both in word and picture.

This book of Dr. Stone's falls in the first class. No one can understand the ceremonials and the outlook of ancient peoples without some knowledge of the prominent part in their daily lives which was played by the *lingam* or *priapus* and the *kteis* or *yoni*, used as symbols of divine favor, goodness and power. Dr. Stone has set forth the pertinent facts regarding this reverence or worship in clear but scientific language, as free from "smut" as it is from prudery, and has performed a valuable service in so doing.

A valuable part of the work is the collection of essays on allied subjects, many of which have been out of print for a long time and are eminently worth republishing. These are: "Sex, the Foundation of the God Idea," by Eliza B. Gamble; "Religious Ideas in Japanese Phallicism," by Dr. Genchi Kato; "Phallicism in Japan," by Edmund Buckley; "The Worship of Priapus," by Hargraves Jennings; "Prostitution in Antiquity," by Dr. Edmund Dupouy; "Sacred Prostitution," by C. Staniland Wake; "Prostitution in Japan," by Douglas C. McMurtrie; "Prostitution in China," by McMurtrie; and "Phallic Worship to a Secularized Sex," by Theodore Schroeder.

Mechanically the book is delightful. The paper is of high quality; the type face is a new one, by McMurtrie, known as "Garymond"—very beautiful and easy to read; the format is almost typical Caxton; the binding is rich and simple. Every true bibliophile will experience joy in handling such volumes.

No student of comparative religions or antiquities can afford to overlook this book and it will prove interesting and entertaining to any thoughtful reader.

CROWE: ARTHRITIS AND RHEUMATISM

THE TREATMENT OF CHRONIC ARTHRITIS AND RHEUMATISM. By H. Warren Crowe, D.M., B.Ch. (Oxon.), M.R.C.S., L.R.C.P. London, New York, etc.: Humphrey Milford, Oxford University Press. 1926. Price \$2.75.

Arthritis and rheumatism continue to attract much attention in England and several books have recently appeared dealing with them.

Dr. Crowe is an avowed advocate of the bacterial origin of these diseases, and the many case reports which he gives will strengthen the opinions of those like him who are convinced that vaccine treatment is the most logical and efficacious. The book is based on the author's twenty years' experience of over one thousand cases of rheumatic diseases. As it is intended for the use of the general practitioner the book is mainly devoted to treatment; and instructions for collection of specimens and regulation of dosage of vaccines are given in appendices.

Dr. Crowe deals only with the nonarticular forms of rheumatism and chronic arthritis, dividing the latter into rheumatoid arthritis, osteoarthritis and mixed arthritis. Osteoarthritis and most forms of nonarticular rheumatism are, the author thinks, streptococcal diseases, whereas rheumatoid arthritis is staphylococcal and due to a particular type of microbe, described in 1912 by the author as *Micrococcus deformans*. While these are the fundamental conditions, many others can act as secondary factors.

Owing to the complexity of the bacteriology, especially in the mixed types of disease, special precautions are necessary in the preparation of vaccines and the author prefers polyvalent stock vaccines.

A chapter on the orthopedic aspects of the treatment of rheumatic diseases is contributed by Dr. W. G. Macdonald.

A long chapter of case reports details the excellent results obtained from vaccine treatment as well as a few failures. Some interesting radiographs show severe osteoarthritic cases before and after vaccine therapy.

W. A. B.

Medical News



1.—Right: Col. Geo. A. Skinner, Senior Instructor; Left: Maj. Bernard Lentz, Drill-Master.

MEDICAL OFFICERS AT CAMP SNELLING

The training camp for Medical Reserve Officers, held at Camp Snelling, Minn., in July, was highly successful. All worked together wholeheartedly to the same good end.



2.—A Company Aid Station.

The instruction was wholly military, as it *should* be. Medical Officers are supposed to be good doctors (even if they are not much as soldiers), and if they are not, it is not the business of the Army to teach them that sort of thing.

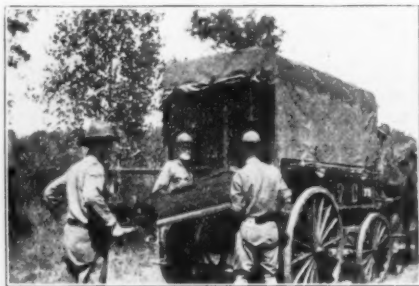
The organization and functions of the Medical Regiment received most considera-



3.—Littering a Patient to the Rear.

tion. This is a rather new organization, about which many (even in the Regular Army) know nothing. It is time it became better known.

The young men of the Medical Section, R. O. T. C., gave a demonstration of medical service in combat, during which they set up and operated all the units, from the Company Aid Station to the Hospital Station (Field Hospital), using hypothetical wounded men and actually doing the dressings and keeping all records, as indicated. This was very interesting and instructive.



4.—Loading Patient into Mule-drawn Ambulance at Regimental Aid Station.

General lectures stressed the reasons for the "Customs of the Military Service," the functions and management of hospital centers and the need, in the United States, for active investigation in the sciences basic for military knowledge and preparedness. This last-named we are almost wholly neglecting in this country, to our detriment.

Discussions, talks and the solution of administrative and tactical problems filled the mornings, and map exercises and the handling of the units of the Medical Regiment occupied most of the afternoons.

The golf tournament was won by 1st Lt. Lester E. Garrison, M.R.C., of Chicago.



MEDICAL SCHOOL, UNIVERSITY OF CHICAGO

Another reason for Chicago's preeminence as a medical center is the significant development which is going on along the Midway.

Here, in the new medical group which has been under construction for three years and will be opened in a few months, all the activities of medical undergraduate life, from the elementary laboratories to clinical and bedside instruction, will be coordinated in physical apposition to each other, so that the student may see the whole as one plan.

Not only that, but in addition the university atmosphere will encourage and foster the spirit of scientific research both in laboratories and in the clinic.

VITAMINE A IN KIPPERED HERRING

A report recently received states that a brand of Norwegian Kipper herring contains about one-fifth as much vitamine A as is found in cod-liver oil. If this works out, the folks who have an appetite for "kippers" can replace a medicine with a food.

UNITED STATES CIVIL SERVICE EXAMINATIONS

The United States Civil Service Commission announces the following open competitive examinations:

Physiotherapy Aide.

Physiotherapy Pupil Aide.

Applications for examinations for positions of physiotherapy aides and physiotherapy pupil aides must be on file with the Civil Service Commission at Washington, D. C., not later than September 17.

Graduate Nurse.

Graduate Nurse (Visiting Duty).

Applications for graduate nurse and graduate nurse (visiting duty) will be rated as received at Washington, D. C., until December 30.

Competitors will not be required to report for examination at any place, but will be rated on their education, training, and experience.

Social Worker (Psychiatric).

Junior Social Worker.

Entrance salary for social worker (psychiatric) \$1,860 a year; for junior social worker, \$1,680 a year.

Applications for these positions will be received by the United States Civil Service Commission at Washington, D. C., until December 30, 1927.

Full information may be obtained from the United States Civil Service Commission, Washington, D. C., or the secretary of the board of United States civil service examiners at the post office or customhouse in any city.

AN ERROR IN THE TABLE OF CONTENTS

Through an error in preparing the table of contents of the August number of CLINICAL MEDICINE AND SURGERY, several incorrect page numbers were used, including all those over 700. The article listed as on page 701 is actually on page 611, and the other articles follow in regular sequence from that.

No articles or pages were omitted from that number, and everything listed in the table of contents will be found if you will be a bit patient and look for it.

INDIAN DENTAL REVIEW

The first number of the Indian Dental Review, a quarterly journal of practical dentistry, published in Karachi, India, is dated June, 1927.

POSTGRADUATE COURSES

Columbia University, of New York City, announces special eight-weeks' courses for medical graduates in general medicine and

dermatology, pediatrics, gynecology, neurology, ophthalmology, pathology, surgery, surgical pathology and bacteriology, to be given at the Mount Sinai Hospital, Fifth Avenue and 100th Street, New York City, from October 17th to December 10, 1927. For further information write to Walter J. Highman, M.D., Secretary, Committee on Medical Instruction, at the above address.

MERCK & CO., INC.

On July 1, 1927, the old and well-known pharmaceutical houses, Merck & Co. and Powers-Weightman-Rosengarten, were consolidated under the title of Merck & Co., Incorporated. George W. Merck is the president of the new organization and Frederick Rosengarten is chairman of the board of directors.

Both of these firms have a long and honorable history and have performed many services for the medical profession. We wish them success and an enlargement of their field of usefulness to medical and chemical science.

OTOLARYNGOLOGISTS ELECT OFFICERS

At the meeting of the Eastern New York Eye, Ear, Nose and Throat Association at Riverwood, Schenectady, the following officers were elected: President, J. Ivimey Dowling, M.D., F.A.C.S.; vice-president, M. S. Lord, M.D.; secretary-treasurer, L. Prescott Brown, M.D.

Membership includes the specialists from Albany, Schenectady, Troy, Glens Falls, Amsterdam, Gloversville and Rutland, Vt.

INTERSTATE POSTGRADUATE MEDICAL SOCIETY

The Interstate Postgraduate Medical Society of North America, and the Kansas City Clinical Society will hold a joint conference at the Shrine Temple, Kansas City, Mo., October 17 to 21.

Physicians who have attended these meetings are enthusiastic about the material presented.

NEW FOOD-POISONING ORGANISM

A new organism, believed to be concerned in food-poisoning, has been discovered by B. A. Linden of the U. S. Bureau

of Chemistry. The organism was found in a sample of cheese believed to be responsible for a local outbreak in Maine, in 1925. This same organism has since been isolated in two other outbreaks in which cheese was the one article of food eaten by all persons affected. The organism seems to belong to the ordinary lactic group.

Dr. C. Thom, in charge of microbiological work for the Bureau of Chemistry, regards the discovery as highly important; he suggests that while there is no general danger from this source of poisoning it offers another argument for the pasteurization of milk before using it in manufacturing dairy products.

CAUSTIC POISONS ACT

The recently closed sixty-ninth Congress finally passed the Caustic Poisons Bill and it has been signed by the President. This bill requires that household packages of lye, ammonia, carbolic acid, oxalic acid and other caustic substances must be labeled "Poison" and be accompanied with instructions for emergency treatment in case of accident.

Organized efforts have been made by the American Medical Association since 1884 to secure this legislation.

CLINICAL CONGRESS OF PHYSICAL THERAPY

The American College of Physical Therapy will hold its sixth annual meeting and Clinical Congress at the Hotel Sherman, Chicago, Ill., October 31 to November 5, 1927. Three days will be devoted to clinical instruction, two to section meetings and one to hospital clinics.

This is the great chance of the year for those who desire to get or keep in touch with the newer developments in physical therapy and the fees are very reasonable.

All physicians in good standing in their county societies are eligible to attend, as well as their assistants and technicians, if properly vouched for.

Full particulars may be obtained from the American College of Physical Therapy, Suite 820, 30 North Michigan Ave., Chicago.

